# A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS

**A THESIS SUBMITTED TO THE BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT (PUNJAB)**

**FOR THE AWARD OF DEGREE OF**

**MD**

**IN**

**MEDICINE**

**BY**

**DR. TWINKLE**

**SUPERVISOR**

**DR. VIPIN KUMAR**

**DEPARTMENT OF MEDICINE**
**DAYANAND MEDICAL COLLEGE AND HOSPITAL**
**LUDHIANA**
**(MAY, 2021)**

# DECLARATION

I declare that the thesis entitled **"A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS"** has been prepared by me under the guidance of **Dr. Vipin Kumar,** Assistant Professor, Department of Medicine, Dayanand Medical College and Hospital, Ludhiana. No part of this thesis has formed the basis for the award of any degree previously.

_____

**Dr. Twinkle**
Department of Medicine
Dayanand Medical College & Hospital
Tagore Nagar
Ludhiana-141001
Punjab

Date:

# CERTIFICATE

I certify that **Dr. Twinkle** has prepared her thesis entitled **"A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS"** for the award of degree of M.D. in Medicine of Baba Farid University of Health Sciences, under my guidance. She has carried out the work at the Department of Medicine, Dayanand Medical College & Hospital, Ludhiana.

The data collected in this thesis is genuine and the work has been carried out by the candidate herself

**Supervisor**

**Dr. Vipin Kumar**
Assistant Professor
Department of Medicine
DMCH, Ludhiana

**Co-Supervisor(s)**

**Dr. Parminder Singh**
Professor & Head
Department of Endocrinology
DMCH, Ludhiana

**Dr. Abhishek Goyal**
Associate Professor
Department of Cardiology
DMCH, Ludhiana

Date:

# ENDORSEMENT BY THE HEAD OF THE DEPARTMENT AND PRINCIPAL

This is to certify that the thesis entitled **"A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS"** is a bonafide research work done by **Dr. Twinkle** under the guidance of **Dr. Dinesh Gupta**, Professor & Head, Department of Medicine, Dayanand Medical College & Hospital, Ludhiana.

**Head of Department**

**Dr. Dinesh Gupta**
Professor & Head
Department of Medicine
DMCH, Ludhiana

**Principal**

**Dr. Sandeep Puri**
Principal
DMCH, Ludhiana

Date:

# COPYRIGHT

### Declaration by the Candidate

I hereby declare that the Baba Farid University of Health Sciences, Faridkot, shall have the rights to preserve, use and disseminate this thesis in print or electronic format for academic / research purpose.

**Dr. Twinkle**
Department of Medicine
Dayanand Medical College & Hospital
Tagore Nagar
Ludhiana-141001
Punjab

Date:

**© Baba Farid University of Health Sciences,**

**Faridkot**

*Dedicated*

*to*

*my family*

*&*

*teachers*

# *ACKNOWLEDGEMENT*

*I am highly grateful to the **Almighty** without whose blessings no work can be conceived, much less completed. HIS presence we feel at each and every step of life. He's the one who holds our hand and guides us through everything.*

*I take this opportunity to thank all those who have been helping me in the successful completion of this work.*

*With deep sense of gratitude, I wish to convey my thanks to my esteemed teacher and supervisor **Dr. Vipin Kumar,** Assistant Professor, Department of Medicine, DMC&H, Ludhiana who has been most helpful and supportive throughout my tenure. His able and mature guidance, ever willing help made the assigned task simpler. He has always been an epitome of excellence for me.*

*It is with great reverence and profound pleasure that I acknowledge the valuable suggestions, scholarly guidance and constant encouragement rendered by my co-supervisor **Dr. Parminder Singh**, Professor, Department of Endocrinology & **Dr. Abhishek Goyal**, Associate Professor, Department of cardiology, DMC&H, Ludhiana. An opportunity to learn from them has been one of special things that this work provided. I am really indebted to them for being so supportive throughout. I take great pride in expressing my gratitude to them.*

*Words are woefully inadequate to express my sense of gratitude to my parents **Mr. Raj Kumar** & **Mrs. Neelam Rani**, for their love, selfless sacrifices, unfailing attention to my needs and blessings that have made me whatever I am today.*

*No words are enough to thank my father **Late Sh. Satpal Goyal,** mother **Mrs. Shakuntala Devi,** my elder brother **Mr. Shankey Singla ,** my younger brother **Er. Hitesh Goyal** whose care, affection, timely help and encouragement have been a constant source of inspiration throughout.*

*All thanks to my friends, my seniors and all my juniors for their brilliant company in this journey. They have been an invaluable support day in, day out for the entire course of work.*

*Thanks to all the patients who have been a part of this study and DMCH staff & residents who made this uphill task possible.*

*A Special Thanks to* ***Mr. Naveen Bhatia, Mrs. Sonika, Mrs. Baljeet Kaur & Mrs. Namita****, Research & Development centre for their efforts.*

***Dr. Twinkle…..***

# ABBREVIATIONS

| | |
|---|---|
| DM | Diabetes Mellitus |
| HF | Heart Failure |
| HFnEF | Heart Failure with normal Ejection Fraction |
| HFmrEF | Heart Failure with mid-range Ejection Fraction |
| HFrEF | Heart Failure with reduced Ejection Fraction |
| LV | Left Ventricle |
| LVH | Left Ventricular Hypertrophy |
| CAD | Coronary Artery Disease |
| NYHA | New York Heart Association |
| PND | Paroxysmal Nocturnal Dyspnea |
| JVP | Jugular Venous Pressure |
| BMI | Body Mass Index |
| FFA | Free Fatty Acid |
| BNP | Brain Natriuretic Peptide |
| ACE-I | Angiotensin Converting Enzyme Inhibitors |
| ARBs | Angiotensin Receptor Blockers |
| CCB | Calcium Channel Blockers |
| CHARM | Candesartan in Heart Failure :Assessment of Reduction in Mortality and morbidity |
| DIG | Digitalis Investigation Group |
| EMPHASIS-HF | Eplerenone in Mild Patients Hospitalization And Survival Study in Heart Failure |
| MAGGIC | Meta-analysis Global Group in Chronic Heart Failure |
| I-PRESERVE | Irbesartan in Heart Failure With Preserved Ejection Fraction |
| RELAX | Phosphodiesterase-5 Inhibition to Improve Clinical Status and Exercise Capacity in Heart Failure with Preserved Ejection Fraction |

# ABSTRACT

**INTRODUCTION:** Heart failure is one of the major cardiovascular complications in patients with diabetes mellitus type 2 (DM). Type 2 diabetes is associated with worse clinical status and increased cardiovascular mortality in both patients with HF with reduced (HFrEF) and preserved ejection fraction (HFpEF) compared to HF without DM type 2.

**AIMS AND OBJECTIVES:** To compare the clinical profile and outcome of patients of acute heart failure with and without type 2 diabetes mellitus admitted in tertiary care centre.

**MATERIAL AND METHODS:** A prospective observational study conducted on admitted patients of acute heart failure who presented to Dayanand Medical College and Hospital, Ludhiana from 1st Jan 2019 to 30$^{th}$ Sept, 2019 and patients were followed up at one month and three months.

**RESULTS:** Total 136 admitted patients of acute heart failure with and without type 2 diabetes mellitus were compared. Mean age for patients having acute heart failure with diabetes was 64.84 ±10.49 years and for non-diabetics patients were 67.76±13.29 years. There was slight female predominance among diabetic group, 55.2 % were females and 44.8 % were males on the other hand among non-diabetic group, 53.1 % were females and 46.9% were males. Duration of hospital stay was significantly longer (i.e. 11.00± 6.29 days) as compared to non-diabetics (i.e. 8.31± 5.59 days).Pulmonary rales were present significantly in more number of diabetics as compared to non-diabetics (71.3% vs 63.1%; p value=0.033). Compared with non-diabetic group, patients with diabetes had more signs and symptoms of heart failure. Diabetic group had statistically more number of obese and overweight individuals as compared to non-diabetics overweight and obese (43.7%,14.9% vs. 30.6%, 0.0% respectively; p value= 0.001). Patients with CAD were significantly more in diabetics as compared to non-diabetics (59.8% vs 36.7%; p value= 0.010). Diabetic patients not having ischemic heart disease, 42.9% patients had HFrEF, 5.7% patients had HFmrEF and 51.4% patients had HFnEF in contrast to non-diabetics in which 45.2% patients had HFrEF, 3.2% patients had HFmrEF and 51.6% patients had HFnEF respectively. Readmission in patients with diabetes was significantly more as compared to non-diabetics (34.5% vs16.3%; p value=0.023).

**CONCLUSION:** Diabetics with heart failure had younger age at presentation, more number of females, obese, longer duration of hospital stay, worse functional status and had more readmission rates as compared with non-diabetics.



**KEYWORDS:** Acute heart failure, type 2 diabetes mellitus, non-diabetics.

# TABLE OF CONTENTS


| S. NO. | TOPIC | PAGES |
|---|---|---|
| I | INTRODUCTION | 1-4 |
| II | AIMS AND OBJECTIVES | 5 |
| III | REVIEW OF LITERATURE | 6-13 |
| IV | MATERIAL AND METHODS | 14-15 |
| V | OBSERVATIONS AND RESULTS | 16-50 |
| VI | DISCUSSION | 51-64 |
| VII | SUMMARY AND CONCLUSION | 65-67 |
| VIII | BIBLIOGRAPHY | 68-78 |
| | APPENDICES – I<br>- PROFORMA<br>- MASTER CHART | |
| | APPENDICES – II<br>- APPROVAL LETTER OF THESIS PLAN<br>- THESIS PLAN | |

# LIST OF TABLES


| Table No. | Title | Page No. |
|---|---|---|
| 1 | Distribution of patients with acute heart failure among diabetic and non-diabetic groups | 22 |
| 2 | Age distribution in patients with acute heart failure among diabetics and non-diabetics | 23 |
| 3 | Gender Distribution of Patients | 24 |
| 4 | Duration of hospital stay in patients with acute heart failure among diabetics and non-diabetics | 25 |
| 5 | Presenting symptoms of patients with acute heart failure | 26 |
| 6 | Duration of presenting complaints among diabetics and non-diabetics having acute heart failure | 27 |
| 7 | NYHA grading of dyspnea on admission | 28 |
| 8 | Past treatment history of patients with acute heart failure | 29 |
| 9 | Personal history of patients | 30 |
| 10 | Family history of diabetes | 31 |
| 11 | General physical examination of study group | 32 |
| 12 | Systemic examination of admitted patients | 33 |
| 13A | Vitals of admitted patients with acute heart failure | 34 |
| 13B | BMI of patients having acute heart failure among both study groups | 35 |
| 14A | Routine investigations of patients | 36 |
| 14B | ECG changes among diabetic and non-diabetic patients | 38 |
| 15A | Echocardiographic findings of acute heart failure patients | 39 |
| 15B | Severity of mitral regurgitation among both groups | 41 |
| 15C | Patients having CAD among diabetic and non- diabetic patients | 42 |
| 15D | Comparison of type of heart failure in patients without CAD | 43 |
| 16 | Discharge status of patients | 44 |
| 17 | Survival status on follow-up at 1 month and 3 months | 45 |

| | | |
|---|---|---|
| 18A | At 1 month, NYHA grading among diabetic and non- diabetics | 46 |
| 18B | At 3 months, NYHA grading among both groups | 47 |
| 19 | Treatment given in hospital to patients with acute heart failure | 49 |
| 20 | Readmission comparison within 3 months among both groups | 50 |

# LIST OF FIGURES


| Fig. No. | Title | Page No. |
|---|---|---|
| 1 | Distribution of patients with acute heart failure among diabetic and non-diabetic groups | 22 |
| 2 | Age distribution in patients with acute heart failure among diabetics and non-diabetics | 23 |
| 3 | Gender Distribution of Patients | 24 |
| 4 | Duration of hospital stay in patients with acute heart failure among diabetics and non-diabetics | 25 |
| 5 | Presenting symptoms of patients with acute heart failure | 26 |
| 6 | Duration of presenting complaints among diabetics and non-diabetics having acute heart failure | 27 |
| 7 | NYHA grading of dyspnea on admission | 28 |
| 8 | Past treatment history of patients with acute heart failure | 29 |
| 9 | Personal history of patients | 30 |
| 10 | Family history of diabetes | 31 |
| 11 | General physical examination of study group | 32 |
| 12 | Systemic examination of admitted patients | 33 |
| 13 | Vitals of admitted patients with acute heart failure | 34 |
| 13B | BMI of patients having acute heart failure among both study groups | 35 |
| 14A | Routine investigations of patients | 37 |
| 14B | ECG changes among diabetic and non-diabetic patients | 38 |
| 15A | Echocardiographic findings of acute heart failure patients | 40 |
| 15B | Severity of mitral regurgitation among both groups | 41 |
| 15C | Patients having CAD among diabetic and non- diabetic patients | 42 |
| 15D | Comparison of type of heart failure in patients without CAD | 43 |
| 16 | Discharge status of patients | 44 |
| 17A | Survival status on follow-up at 1 month and 3 months | 45 |

| | | |
|---|---|---|
| 17B | Line diagram showing trend of survival status at discharge, at 1 month and at 3 months | 45 |
| 18A | At 1 month, NYHA grading among diabetic and non- diabetics | 46 |
| 18B | At 3 months, NYHA grading among both groups | 47 |
| 18C | Line Diagram showing NYHA grading among both groups on admission, at 1 month and at 3 months | 48 |
| 19 | Treatment given in hospital to patients with acute heart failure | 49 |
| 20 | Readmission comparison within 3 months among both groups | 50 |

# INTRODUCTION

Throughout the world, heart failure has been singled out as an emerging epidemic especially in elderly individuals. This is attributed to increased longevity of life, better survival from myocardial infarctions with subsequently damaged hearts and increasing incidence of diabetes, obesity and hypertension. Over the past decade, the rate of hospitalization for heart failure has increased by 159% in western countries.

Rapidly and accurately determining the etiology of acute dyspnea in patients presenting in an emergency is extremely important. Heart failure (HF) is one of the major cardiovascular complication in patients with diabetes mellitus type 2 (DM type 2) and it increases the risk of morbidity and mortality. Approximately 6.5 million Americans have Heart Failure and the prevalence is expected to increase by 46% by 2030.[1] Heart failure is diagnosed in patients who present with non-specific symptoms like breathlessness, ankle swelling and signs like basal lung crackles. To confirm clinically suspected heart failure, we rely on the ejection fraction of the left ventricle.

Technically, Echocardiography (ECHO) is useful to evaluate systolic function in patients suspected to have heart failure. But upto 50% of patients with heart failure may have preserved ejection fraction (i.e. Diastolic heart failure). Both Heart failure with preserved ejection fraction (HFpEF) and Heart failure with reduced ejection fraction (HFrEF) are observed in DM type 2 and are often misdiagnosed in these patients. Left ventricle hypertrophy (LVH), left atrial dilatation, diastolic dysfunction and subclinical systolic dysfunction indicated as reduced global longitudinal strain are major abnormalities on ECHO in patients with diabetic cardiomyopathy. LVH causes diastolic dysfunction, which is an early manifestation of diabetic cardiomyopathy and is present in 40-75% of patients with diabetes type 2.[2]

The best way to diagnose these patients is unclear. Brain natriuretic peptide (BNP) increases when cardiac myocytes are strained. Therefore, BNP is an effective method for detecting heart failure with or

without systolic dysfunction.

According to ESC guidelines 2016, Heart failure comprises a wide range of patients, from those with normal Left Ventricle Ejection Fraction (LVEF) [typically considered as ≥50%; HF with preserved EF (HFpEF)] to those with reduced LVEF [typically considered as <40%; HF with reduced EF (HFrEF)]. Patients with LVEF in the range of 40-49% represent a 'grey area', which we now define as HFmrEF.[3]

Diabetes mellitus (DM) has become one of the most prevalent issues in the last few decades, hand-in-hand with the rising obesity crisis. It is now the seventh leading cause of death in the USA as well as worldwide, with 5.2 million deaths globally attributed to diabetes, a mortality rate of 82.4 per 100,000[4] with 252,806 deaths in the USA alone in 2015.[5]

DM is caused by issues with insulin production by the pancreas or resistance by end-organ tissues and presents as high blood glucose or elevated glycosylated hemoglobin (HbA1C). Type 2 diabetes mellitus accounts for 90-95% of diagnosed DM.[6] Type 2 diabetes mellitus is a complex disease that leads to continuous medical care with comprehensive, multifactorial strategies for reducing cardiovascular risk. India is the world's capital of known diabetes. There are currently more than 30 million people living with diabetes in India. The prevalence of diabetes in India is projected to increase from 32 million (2000) to 70 million (2025).[7] The incidence of HF has been demonstrated to increase from 2.3 per 1000 person-years for a HbA1C<6% to 11.9 per 1000 person-years for a HbA1C>11.9%. Taking the estimate of HF incidence based upon optimal glucose control, the annual incidence of HF due to diabetes may increase from 73,600 (2000) to 1,61,000 (2025). After 5 years of HF incidence based upon the diabetes estimates for the year 2000, the total number of HF patients accrued could be 3,68,000 with an estimated 50% mortality at 5 years, the prevalence of HF due to diabetes alone could be estimated at 1,84,000. However, this is likely to be an underestimate, due to conservative estimates of HbA1C[8]. Poor glycemic control is associated with an increased incidence of cardiovascular events and

mortality. Each 1% increase in the level of HbA1C is associated with an 8% increase in myocardial infarction[9]. Patients with diabetes have a 4 times higher risk of developing heart failure than those without diabetes.

Diabetes mellitus type 2 is a chronic disease with increasing prevalence. About 194 million people worldwide in the age group of 20-79 years were estimated to have diabetes in 2003.[10] The number of diabetic patients will rise to a projected 592 million by 2035, which is expected to result in a substantial burden due to various acute and chronic complications of diabetes.[11]

The coexistence of heart failure and type 2 diabetes mellitus is common and has a strong impact on clinical management and prognosis. Cardiovascular disease is the most common cause of death in those with diabetes.[12] About 45% of patients with HFpEF have diabetes. The prevalence of diabetes is increasing in patients with new-onset HFpEF.[13] Data from the registry and community-based studies demonstrate that patients with HFpEF are more often older, female and have multiple comorbidities like hypertension, obesity.[14] Type 2 diabetes is associated with worse clinical status and increased all-cause and cardiovascular mortality (10-12 times) in both patients with HF with reduced (HFrEF) and preserved ejection fraction (HFpEF) compared to HF without DM type 2. Coronary artery disease (CAD) is the most common concomitant condition that causes heart failure in patients with DM type 2, along with hypertension. However, mortality in both patients of ischemic and non-ischemic heart failure[15] indicating that CAD is not the only cause of heart failure in DM type2.

Some diabetic patients develop heart failure without having CAD or hypertension and the condition is known as Diabetic Cardiomyopathy (DCMP). It is defined as myocardial dysfunction in the absence of all other cardiovascular diseases. Mostly DCMP in DM type 2 has a phenotype of HFpEF. Left Ventricle (LV) diastolic dysfunction can be detected in 75% of diabetic patients,[16] almost half of them have HFpEF. There are multiple derangements in HFpEF as an impaired diastolic and systolic reserve, atrial function, autonomic tone and

skeletal muscle function.

Biomarkers profile of HFpEF also supports a pro-inflammatory phenotype as opposed to markers of cardiac stretch in HFrEF. Degree of glycemic control correlates with LV diastolic dysfunction severity, risk of incident heart failure, cardiovascular abnormality in diabetic patients.[17] Every 1% increase in HbA1C was associated with a 3.0gm increase in LV mass.[18]

We therefore, conducted a study to evaluate the clinical profile and type of heart failure in patients with type 2 diabetes versus non-diabetics. We studied the outcome of such patients by following up the patients at one month and three months.

## AIMS AND OBJECTIVES

To compare the clinical profile and outcome of patients of acute heart failure with and without type 2 diabetes mellitus admitted in a tertiary care center.

# REVIEW OF LITERATURE

Epidemiologic and clinical data from the last two decades have led to the recognition that, in addition to myocardial infarction and other atherosclerosis related cardiovascular events; heart failure is a major contributor to cardiovascular mortality and morbidity in patients with diabetes. In certain patients with diabetes, the observation that myocardial dysfunction is present in the absence of coronary artery disease, valvular disease and the sequelae of associated cardiovascular risk factors has led to the use of the poorly understood term “Diabetic cardiomyopathy”. This term was first used in 1972 by Rubler et al[19] describing myocardial dysfunction in patients with diabetes in absence of coronary artery disease, hypertrophy, or valvular heart disease.

There is ongoing discussion whether diabetic cardiomyopathy exists as specific entity or not, as considered by Ernande and Derumeaux in their review from 2012, “Diabetic cardiomyopathy: myth or reality?”[20] This discussion reflects the fact that little is known about the pathophysiology and the underlying molecular mechanism of heart failure in patients with diabetes.

Only recently have clinical and epidemiological data demonstrated the incidence, prevalence and prognosis of heart failure in patients with diabetes mellitus type 2. To date, heart failure has been described as heart failure with preserved ejection fraction (HFpEF) and heart failure with reduced ejection fraction (HFrEF), according to left ventricular function. To dichotomize heart failure into these 2 entities has certain limitations and probably does not cover an intermediate stage that most recent guidelines of the European Society of Cardiology (ESC) termed heart failure with mid-range ejection fraction (HFmrEF); Ejection fraction: 40-49%.[10]

The prevalence of heart failure is approximately 1-2% of the adult population in developed countries, rising to ≥ 10% among people >70 years of age.[21] Among people with >65 years of age presenting to primary care with breathlessness on exertion, one in six will have

unrecognized heart failure (mainly HFpEF). The lifetime risk of heart failure at age of 55 years is 33% for men and 28% for women.[22]The proportion of patients with HFpEF ranges from 22 to 73%, depending on the definition applied, the clinical setting (primary care, hospital clinic and hospital admission), age and sex of the studied population, previous myocardial infarction.

Diabetes and heart failure often occur concomitantly and each disease independently increases the risk for the other. In heart failure cohorts, including both HFrEF and HFpEF, the prevalence ranges from 10-47%.[23] The prevalence of diabetes is higher in patients hospitalized with heart failure, with some reports of >40%.[24]In patients with diabetes, the prevalence of heart failure is between 9 to 22%, which is four times higher than the general population and the prevalence is even higher in patients with diabetes who are >60 years old.[25]

Observational studies have consistently demonstrated a 2 to 4 fold increased risk of heart failure in individuals with diabetes compared with those without diabetes. In the Framingham heart study, diabetes was associated with a nearly two fold increase in the risk of incident heart failure in men and a fourfold increase in women.[26] In patients with known coronary artery disease (CAD) in the Heart and Soul Study, diabetes was also associated with a higher adjusted risk of incident heart failure (hazard ratio [HR],3.34 [95% CI, 1.65-6.76]).[27] Diabetes is also an important predictor of the development of symptomatic heart failure in patients with asymptomatic LV systolic dysfunction.[23] The risk of incident heart failure among patients with diabetes increases with older age, CAD, peripheral arterial disease, longer duration of diabetes, obesity, hypertension and higher BNP.[28,29] The risk of heart failure is increased even with milder abnormalities in glucose regulation.

In a prospective cohort study of 18084 people without diabetes at high risk for cardiovascular disease, a 1-mmol/l higher fasting plasma glucose was associated with a 1.23-fold increased risk of heart failure hospitalization (95% CI, 1.03-01.47).[30] The ARIC study similarly

demonstrated a progressively increasing risk of incident heart failure hospitalization with a rising HbA1C among participants without diabetes or heart failure.[31] Smaller studies further linked insulin resistance to an increased risk of incident heart failure and the development of systolic and diastolic dysfunction.[32, 33]

Metabolic impairment is intrinsic to heart failure pathophysiology and insulin resistance is present in upto 60% of patients with heart failure. Among non-diabetic patients with heart failure enrolled in the CHARM program (Candesartan in Heart failure: Assessment of Reduction in Mortality and Morbidity)[34] and EMPHASIS-HF (Eplerenone in Mild Patients Hospitalization and Survival Study in Heart Failure),[35] the incidence of diabetes was 28 and 21 per 1000 persons-years respectively, which is substantially higher than adults of similar age in the general population (9.4-10.9 per 1000 person-years for adults 45 and older).[36]

Type 2 Diabetes is a complex disease that leads to continuous medical care with comprehensive, multifactorial strategies for reducing cardiovascular risk. Patients with type 2 diabetes have risks of death and cardiovascular events that are 2 to 4 times as great as the risk in the general population. Diabetes is a major epidemic in the world. About 194 million people worldwide or 5.1% in the age group of 20-79 were estimated to have diabetes in 2003. This estimate expected to increase to some 33 million or 6.3% of the adult population by 2025[10] which is expected to result in a substantial disease burden due to various acute and chronic complications of diabetes.

The coexistence of heart failure and type 2 diabetes mellitus is common and has a strong impact on clinical management and prognosis. Type 2 diabetes is associated with worse clinical status and increased all cause and cardiovascular mortality in patients with reduced (HFrEF) and preserved ejection fraction(HFpEF), compared to HF without Type 2 diabetes.[37] Conversely, HFrEF is an independent predictor of fatal and non-fatal clinical outcomes in patients with type 2 diabetes.[38]

The major causes of heart failure in diabetes include coronary artery disease and hypertension, but also a possible direct detrimental effect of diabetes on myocardium.[39] In the Reykjavik study in the general population, the prevalence of heart failure in people with diabetes was 12%.[40] In this study, heart failure was more common in patients with type 2 diabetes aged >70 years (i.e.16% and 22% of men and women respectively). In the Kaiser Permanente population, patients with type 2 diabetes aged <75 years had an approximately three fold higher prevalence of heart failure compared to those without diabetes.[41] In those aged 75-84 years, type 2 diabetes was associated with a doubling of risk for heart failure.

Patients with heart failure and diabetes have worse clinical outcomes than patients with heart failure without diabetes. In population based studies, concomitant diabetes increases the risk of death in both hospitalized and ambulatory patients with heart failure.[42] Multivariable heart failure risk models e.g. Meta-analysis Global Group in Chronic Heart Failure (MAGGIC) frequently highlight diabetes as an independent risk factor for death.[43]

In community based heart failure cohorts, presence of diabetes carries adverse risk of death and hospitalization for patients with HFrEF and HFpEF.[44] In the CHARM trial, diabetes was associated with a greater relative risk of cardiovascular death or heart failure hospitalization in patients with HFpEF(HR, 2.0 [95% CI, 1.70-2.36]) than in those with HFrEF(HR, 1.60 [95% CI, 1.44-1.77]; interaction p=0.0009), but for all-cause mortality, the risk conferred by diabetes was similar in both HFpEF and HFrEF.[45] In the I-PRESERVE trial (Irbesartan in Heart Failure with Preserved Ejection Fraction), over a median follow up of 4.1 years, cardiovascular death or heart failure hospitalization occurred in 34% of patients with diabetes and HFpEF versus 22% of HFpEF patients without diabetes (adjusted HR, 1.75) and all-cause mortality was 28% and 19%, respectively (adjusted HR, 1.59).[46]

Diabetes Mellitus Type 2 is a common finding in patients with heart

failure, just as heart failure is a common finding in patients with type 2 diabetes. In clinical trials of type 2 diabetes, the prevalence of heart failure at baseline has varied b/w approximately 10% and 30%.[47] Various epidemiologic data have shown that prediabetes is associated with a high risk of heart failure. It has been suggested that at least 70% of all patients with heart failure may now have prediabetes or diabetes mellitus. At least a third of all patients admitted to hospital with heart failure may have diabetes. Equally, patients with type 2 diabetes have over twice the risk of heart failure than people without diabetes.

The admission rate of patients with heart failure is higher in those with diabetes because diabetes and its associated comorbidities contribute to the progression, complexity and severity of heart failure, making their cardiovascular homeostasis all the more precarious. For example, in the PARADIGM-HF studies, prediabetes was associated with increased risk for hospitalization for heart failure. But with diabetes, that risk increased further to almost twice that observed in non-diabetic patients.[39]

A study by Cheng et al.[48] using data from GWTG-HF (Get With The Guidelines- Heart Failure) registry found no difference in 1 year mortality between HFrEF and HFpEF, whereas HFrEF patients had higher rates of HF readmission, HFpEF patients had higher rates of all-cause readmission. Mortality due to non-cardiovascular causes is higher in HFpEF than HFrEF, likely due to the increased comorbidity burden. Sudden death accounts for around 20% of total mortality in recent HFpEF studies and is predicted by male sex.

A comparison of the baseline characteristics of the PARAGON-HF (Prospective Comparison of Angiotensin Receptor Neprilysin Inhibitor With Angiotensin Receptor Blocker Global Outcomes in Heart Failure and Preserved Left Ventricular Ejection Fraction) trial showed that whereas enrollees had a similar age and sex distribution compared with previous HFpEF trials, they had a higher prevalence of comorbidities, including diabetes and chronic kidney disease, when compared with other HFpEF trial enrollees.[49]

Yu-Yang Chen et al conducted study on total of 624 patients from October 2000 to April 2014. All patients were stratified by three groups according to their fasting plasma glucose levels {i.e. diabetes mellitus (DM), impaired fasting glucose (IFG), and non-DM}. A total of 587 patients were included in final analysis. The all-cause mortality rates of patients with DM, IFG and non-DM were 55.5%, 40.3% and 39.2% with significant difference (p=0.001). Moreover compared with those with IFG (34.3%) and non-DM (32.6%), patients with DM had significantly higher rate of cardiovascular mortality (45.1%).[50]

A large community based cohort study of 6814 subjects without coronary vascular disease at baseline was followed for 4 years and the incidence of heart failure, depending on the presence of metabolic syndrome, was analyzed. The study showed that features of metabolic syndrome were associated with an increased risk of heart failure, with two-third of patients developing HFrEF.[51]

Data from multiple trials suggest that diabetes is associated with worse morbidity and mortality in HFpEF. The CHARM trial followed 3,023 patients with LVEF>40% for a mean follow-up period of 37.7 months.[37] Patients with diabetes had more signs and symptoms of volume overload, worse functional status, higher body mass index and higher rates of hypertension, ischemic heart disease and worse renal function compared with those without diabetes. Diabetes was associated with a two fold increase in cardiovascular death or heart failure hospitalization, as well as increase in all-cause mortality. The study also examined the effect of diabetes in patients with low LVEF (<40%) and found that the association of diabetes with cardiovascular mortality and HF readmissions were greater in HFpEF than those with low HFEF. Of note, at the time of the study, patients with LVEF between 40% and 49% were included in the HFpEF group.[37] Patients with HFmrEF may be more similar in characteristics to HFrEF than HFpEF.[52]

The DIG trial (Digitalis Investigation Group) followed 987 patients with LVEF >45% for 37 months. Patients with diabetes had higher Body

Mass Index (BMI). Diabetes was associated with a 68% increased risk of heart failure hospitalization or death, as well as increased hazard of total mortality.[53]

The I-PRESERVE trial included 4,128 patients with LVEF >45% for 4.1 years. Patients with diabetes were younger, had higher BMI, more signs of volume overload, worse quality of life and higher levels of NT-pro BNP. Detailed echocardiography data were obtained for 745 patients. Patients with diabetes had larger end-systolic and end-diastolic dimensions, left ventricular mass and left atrial area. There were no significant differences in left ventricular systolic function. Diabetes was associated with increased hazard of the composite outcome of cardiovascular death or heart failure hospitalization, as well as all- cause mortality.[46]

The RELAX (Phosphodiesterase-5 Inhibition to Improve Clinical Status and Exercise Capacity in Heart Failure with Preserved Ejection Fraction) trial followed 216 patients with LVEF>50% for 6 months. Patients with diabetes were younger, more obese and male with higher proportion of hypertension. Echocardiographic data showed that patients with diabetes had no difference in measures of systolic and diastolic function. Patients with diabetes had increased left ventricular mass, but no differences in left ventricular volume or wall thickness.[54]

The most meaningful clinical endpoints for prognosis and outcome in patients with heart failure are mortality and hospitalization for heart failure. The risk for these endpoints is markedly increased in subjects with diabetes compared with the subjects without diabetes. The Danish Investigations of Arrhythmia and Mortality on Dofetilide (DIAMOND) study assessed the influence of diabetes on risk of death in 5491 patients hospitalized with congestive heart failure when followed up for 5 to 8 years. In this study population 16% of patients had diabetes at baseline and approximately 50% had an ejection fraction <35%, suggesting that both HFrEF and HFpEF were present in this subpopulation.[55]

A retrospective cohort study of 232,656 patients HFpEF hospitalized

for new or worsening heart failure in the GWTG-HF registry[56] between 2006 and 2017, of which 62,402 patients were linked with Medicare claims for analysis of post-discharge outcomes. Patients with diabetes had a lower rate of in-hospital mortality compared with those without diabetes (2.1% vs. 2.8%), in adjusted analysis, diabetes was not independently associated with in-hospital mortality.

In a retrospective cohort followed for up to 72 months, patients with type 2 diabetes were more likely to develop heart failure than patients without type 2 diabetes (incidence rate 30.9 vs 12.4/ 1000 person-years, rate ratio 2.5).[57] In elderly patients with type 2 diabetes, the incidence of heart failure was two-fold higher compared to patients without type 2 diabetes (121 vs 62 cases/ 1000 patient-years).[58] Recently, a population-based study of 1.9 million patients with type 2 diabetes without overt cardiovascular disease, followed for 5.5 years, demonstrated that incident HF was observed more frequently (14.1%) than vascular events, including myocardial infarction(MI) or stroke.[59]

# MATERIALS AND METHODS

This was a prospective study conducted on patients with acute heart failure who presented to Dayanand Medical College and Hospital, Ludhiana from 1st Jan 2019 to 30th Sept 2019 and patients were followed up at one month and three months.

**SOURCE OF DATA**

The study included indoor patients presented to the department of Medicine and other allied specialties of Medicine, Dayanand Medical College and Hospital, Ludhiana and who had acute heart failure.

**METHOD OF COLLECTION OF DATA**

**INCLUSION CRITERIA**

- Age >40 years
- Patients admitted with symptoms and signs of acute heart failure.

**EXCLUSION CRITERIA**

- Patients having chronic kidney disease( serum creatinine levels >2mg/dl)
- Patients with chronic liver disease and chronic obstructive airway disease.
- Pregnant females.
- Patients having myocarditis, restrictive or hypertrophic cardiomyopathy.
- Patients with valvular heart diseases.
- Patients having malignancy.
- BNP levels <100 pg/ml

All the patients included in the study were assessed as follow:

**1. Clinical assessment**

- A detailed history of presenting complaints was taken.
- Relevant past history, personal history, drug history and family history were also taken.
- Findings of the general and systemic examination were recorded.

**2. Laboratory investigations**

- The results of routine investigations like CBC, LFT, RFT, ECG, Chest X-RAY and RBS were recorded in all cases. ECG findings

included ST-T wave changes, arrhythmias (atrial flutter, atrial fibrillation), heart blocks, bundle branch blocks (RBBB, LBBB, Bifascicular block) LVH and CAD changes.

- The results of BNP levels, 2D ECHO, HbA1C, TROP-T levels (optional) were recorded and compared between the two groups.

**OUTCOME**

The outcome of the patients was recorded as follow:

- The outcome of the patient at the end of the hospital stay- Discharged/ Death, the severity of dyspnea according to NYHA.

**FOLLOW- UP**

All patients were followed up at an interval of one month and three months either by patient visit or telephonically to see the dyspnea according to NYHA grade, readmission and survival status.

**STATISTICAL ANALYSIS**

Data was described in terms of range; mean±standard deviation (±SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. Comparison of quantitative variables between the study groups was done using Student t-test and Mann Whitney U test for independent samples for parametric and non-parametric data respectively. For comparing categorical data, Chi-square ($\chi 2$) test was performed and the exact test was used when the expected frequency is less than 5. A probability value (p-value) less than 0.05 was considered statistically significant. All statistical calculations was done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

# OBSERVATION AND RESULTS

**Demographic Assessment**

(Table 1, 2 and 3)

A total of 136 consecutive patients admitted with acute heart failure that satisfied the inclusion criteria were studied and the following observations were made. Among all 136 patients enrolled in the study, 87 (64%) patients were diabetic and 49 (36%) patients were non-diabetic (Table 1).

The mean age for patients with diabetes was 64.84±10.49 years and for non-diabetic patients were 67.76±13.29 years. The median age for patients with diabetes was 63 years (58-72 years) and for non-diabetics was 70 years (61-76 years) (Table 2). Patients with diabetes were younger as compared to non-diabetics but this difference was statistically non-significant.

Among diabetic patients, 48 (55.2%) were females and 39 (44.8%) were males. Among non-diabetic patients, 26 (53.1%) were females and 23 (46.9%) were males (Table 3). Patients were more often females in both the groups but there was no statistically significant difference in both the groups.

**Symptoms of Acute Heart Failure**

(Table 4, 5, 6 and 7)

In diabetic patients duration of hospital stay was significantly longer as compared to non-diabetics (11.00±6.29 vs 8.31± 5.59 days; p value=0.014) (Table 4).

Pedal edema was present among 26.4% diabetic patients and 12.2% non-diabetics. Palpitations were present among 5.7% diabetics and 2.0% non-diabetics. Among diabetics 4.6% patients and 4.1% of non-diabetic had syncope. Chest pain was present as a presenting symptom in 12.6% of diabetic and 14.3% non-diabetic. Diabetic patients presenting with orthopnea was 25.3% while non-diabetic was 20.4%. Paroxysmal nocturnal dyspnea (PND) was present in 14.9% of diabetics and 8.2% of non-diabetics. Diabetic patients who had fever were 14.9% and non-diabetic was 12.2%. Surgical stress was present

in 1.1% of diabetics and 2.0% of non-diabetics (Table 5). There was no significant difference in presenting complaints.

Duration of breathlessness was longer in patients with diabetes (10.90±16.18 days) as compared to non-diabetics (5.88±10.58 days) which was just short of statistical significance (p value= 0.053). Feet swelling duration in diabetics was almost similar to non-diabetics (3.17±7.38 days vs 1.22±4.81 days). Diabetic patients had palpitation for 0.10±0.57 days and non-diabetics for 0.06±0.32 days. Duration of fatigue in diabetics was 1.22±5.01 days while among non-diabetics was 1.14±4.83 days. Syncope was present for 0.05±0.21 days among diabetics and non-diabetics for 0.10±0.59 days. Diabetic patients had chest pain for 0.47±2.40 days while non-diabetic had chest pain for 0.20±0.54 days. Orthopnea in diabetics was present for 3.21±13.52 days as compared to non-diabetics 0.45±1.80 days. Duration of PND in diabetics was 2.62±13.43 days and in non-diabetics 0.45±1.80 days. Diabetic patients had a fever for 0.79±2.80 days and non-diabetic had a fever for 0.57±2.30 days (Table 6).

Diabetic patients presenting with NYHA grade 1 were 2.3%, NYHA grade 2 were 14.9%, NYHA grade 3 were 43.7% and NYHA grade 4 were 39.1% While non-diabetic patients presenting with NYHA grade 2 were 28.6%, NYHA grade 3 were 38.8% and NYHA grade 4 were 32.7% (Table 7). Thus, patients with diabetes had higher NYHA grading of dyspnea as compared to non-diabetic patients.

**Other Histories (Past, Personal and Family)**

(Table 8, 9 and 10)

Diabetic patients who were taking Angiotensin Converting Enzyme Inhibitor (ACE-I) or Angiotensin Receptor Blockers (ARBs) was 27.6% and 18.4% of non-diabetic patients were taking ACE-I or ARBs. In contrast, Calcium Channel Blockers (CCBs) was being taken by 20.7% of diabetics and 36.7% of non-diabetics (Table 8) and this difference was statistically significant (p-value = 0.046).

Both the groups had a similar number of alcoholic patients i.e. 26.4% among diabetics and 26.5% among non-diabetics. The number of

smokers was 14.3% among diabetics and 3.4% among the non-diabetic group (Table 9). Smokers among diabetic patients were significantly more as compared to smokers among patients without diabetes. The history of diabetes in the family was similar in both the groups and was non-significant (Table 10).

**Examination**

(Table 11, 12,13A and 13B)

The most common physical sign observed in our study was pedal edema which was present in 42.5% of diabetic patients and 30.6% of non-diabetic patients followed by raised JVP which was present in 26.4% of diabetics and 18.4% of non-diabetics. Diabetic patients (9.2%) having pallor were almost similar with non-diabetics (6.1%) (Table11).

On respiratory system examination, pulmonary rales were present in 71.3% of diabetics and 63.1% of non-diabetics (p value=0.033) which showed that diabetics were significantly more symptomatic. On per abdomen examination, hepatomegaly was present in 9.2% of diabetics and 4.1% of non-diabetics (Table 12).

There was no significant difference in vitals (pulse rate, blood pressure, respiratory rate and saturation) of diabetic and non-diabetic patients (Table 13A). Diabetic patients contain statistically more number of obese (43.7%) and overweight (14.9%) individuals as compared to non-diabetics. Among non-diabetics 30.6% were overweight (p value=0.001) (Table 13B).

**Investigations**

(Table 14A, 14B, 15A, 15B, 15C and 15D)

Laboratory investigation data of our study revealed the presence of significantly low hemoglobin in diabetic patients in comparison to non-diabetic patients (10.37±2.10g/dl vs 11.80±2.38 g/dl; p value = 0.000). Non-diabetic patients had significantly high TLC in contrast to diabetics (12.83±6.26x $10^3/mm^3$ vs 10.83±5.00 x $10^3/mm^3$; p value = 0.047). ESR was significantly higher among diabetics in comparison to non-diabetic (43.48±30.90 vs 32.37±22.06; p value = 0.028). Creatinine

levels were slightly more (1.19±0.39 mg/dl) in diabetics and (1.14±0.40 mg/dl) in non-diabetics. Levels of BNP were slightly higher (1403.56 pg/ml) among diabetic patients in comparison to non-diabetics (1117.45 pg/ml) but the difference is not significant statistically. Troponin-T (TROP-T) value was almost similar in non-diabetic patients (0.28±0.85 ng/ml) and among diabetics (0.39±0.81 ng/ml) (Table 14A).

The most common ECG finding was ST-T wave changes. It was present in (33.3%) of diabetics and (20.4%) non-diabetics followed by bundle branch blocks (RBBB, LBBB, and Bifascicular block) and arrhythmias (atrial flutter, atrial fibrillation) (Table 14B).

Diabetic patients had a low mean ejection fraction of (37.25±13.81%) as compared to non-diabetics (41.24±15.25%). There was no statistically significant difference in left ventricular systolic function. Detailed Echocardiography of diabetic and non-diabetic patients showed no significant difference in end-systolic and end-diastolic dimensions, left ventricular mass and left the atrial area (Table 15A). Among patients having diabetes, mild MR was present in 35.6% of patients while in non-diabetic patients mild MR was found in 26.5% of patients. Moderate and severe MR was found in 31.0% and 1.1% diabetics but 20.5% and 2.0% of non-diabetics respectively (Table 15B).

The number of patients having coronary artery disease (CAD) among diabetics was 52 (59.8%) and among non-diabetics 18 (36.7%) had CAD. Patients with CAD were significantly more in number as compared to non-diabetics (p value= 0.010) (Table 15C).Diabetic patients not having ischemic heart disease, 42.9% patients had HFrEF**,** 5.7% patients had HFmrEF and 51.4% patients had HFnEF in contrast to non-diabetics in which 45.2% patients had HFrEF**,** 3.2% patients had HFmrEF and 51.6% patients had HFnEF respectively (Table 15D).

**Survival Status on Discharge and Follow up**

(Table 16, 17)

One diabetic patient went DAMA and two non-diabetic patients went

DAMA. Death in diabetic patients was 4.6% and in non-diabetic patients was 4.1% (Table 16). Diabetic patients who died at 1 month were six and at 3 months 10 patients died. On the other hand, non-diabetic patients who died at 1 month were three and at 3 months five patients died (Table 17). There was no difference in the percentage of DAMA, deaths and discharges in the two groups.

**Severity of Dyspnea on Follow up**

(Table 18A and 18B)

In our study at 1 month, among diabetics, 24.1% patients had NYHA grade 1, 63.2% patients had NYHA grade 2 and 5.7% patients had NYHA grade 3. While at 3 months, 19.5% of patients had NYHA grade 1, 49.4% had NYHA grade 2, 17.2% patients had NYHA grade 3 and 2.3% patients experienced NYHA grade 4 of dyspnea. Compared with diabetic patients, among non-diabetics, 24.5% patients had NYHA grade 1, 57.1% patients had NYHA grade 2 and 8.2% patients had NYHA grade 3 at 1 month. While at 3 months, non-diabetic patients having NYHA grade 1 was 32.7%, NYHA grade 2 was 42.9%, NYHA grade 3 was 8.2% and NYHA grade 4 was 2.0% (Table 18B). Although diabetic patients were more symptomatic there was no statistically significant difference between NYHA grades of dyspnea in both diabetics and non-diabetic patients at 1 month and at 3 months.

**Treatment Given**

(Table 19)

Antiplatelet therapy was administered significantly more often to diabetic patients as compared to non-diabetics (96.6% vs 83.7%; p value = 0.024). Statistically significant data was also found in the comparison of statins which were given more commonly to diabetic patients as compared to non-diabetics (98.9% vs 87.8%; p value = 0.005). Diuretics were prescribed equally to both diabetic and non-diabetic patients. More number of the diabetic patients (40.2%) received ACE-I or ARBs in contrast to non-diabetics (34.7%). Statistically significant was found regarding the use of CCBs. Non-diabetic patients (16.3%) were receiving more CCBs as compared to

diabetics (4.6%). Vasodilators, mineralocorticoid antagonist and beta-blockers were given more commonly to diabetic patients (26.4%, 25.3% and 19.5%) in comparison to non-diabetics (24.5%, 18.4% and 24.5%) (Table19).

**Readmission within 3 Months**

(Table 20)

Readmission in patients with diabetes was significantly more as compared to non-diabetics (34.5% versus 16.3%; p-value= 0.023).

**Table 1. Distribution of patients with acute heart failure among diabetic and non-diabetic groups**

| | NO. OF CASES | PERCENTAGE |
|---|---|---|
| Diabetic (DM) | 87 | 64.0% |
| Non-Diabetic (Non-DM) | 49 | 36.0% |

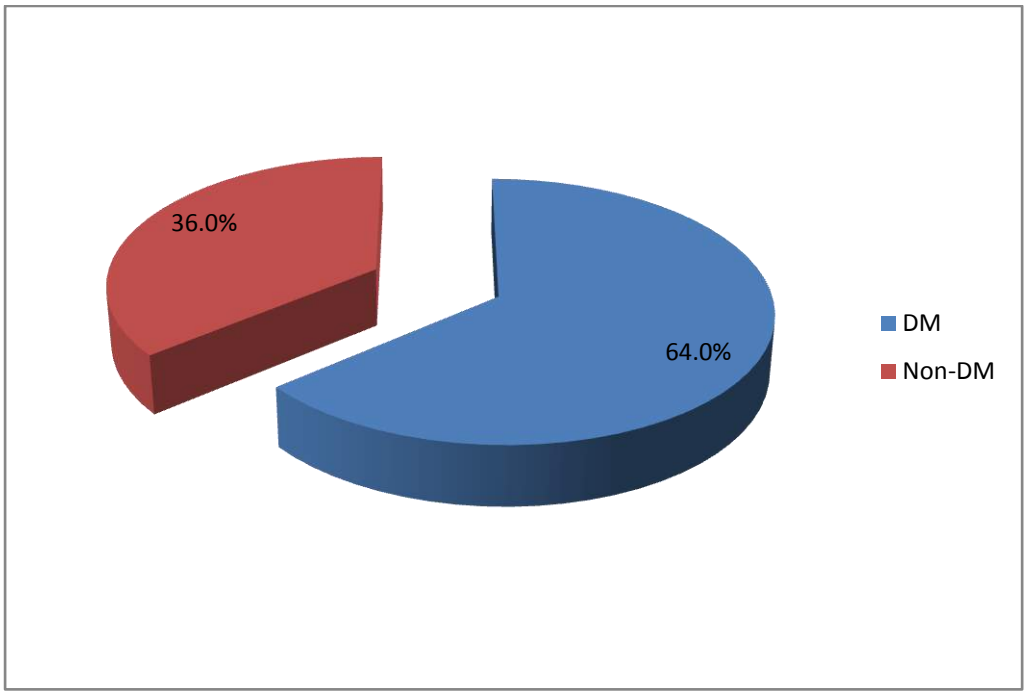


**Figure 1: Distribution of patients with acute heart failure among diabetic and non-diabetic groups**

**Table 2. Age distribution in patients with acute heart failure among diabetics and non-diabetics**

| | DM (n=87) | | Non-DM (n=49) | | P-VALUE |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Age(Years) | 64.84 | 10.49 | 67.76 | 13.29 | 0.161 |
| Median (IQR) | 63 | 58-72 | 70 | 61-76 | |

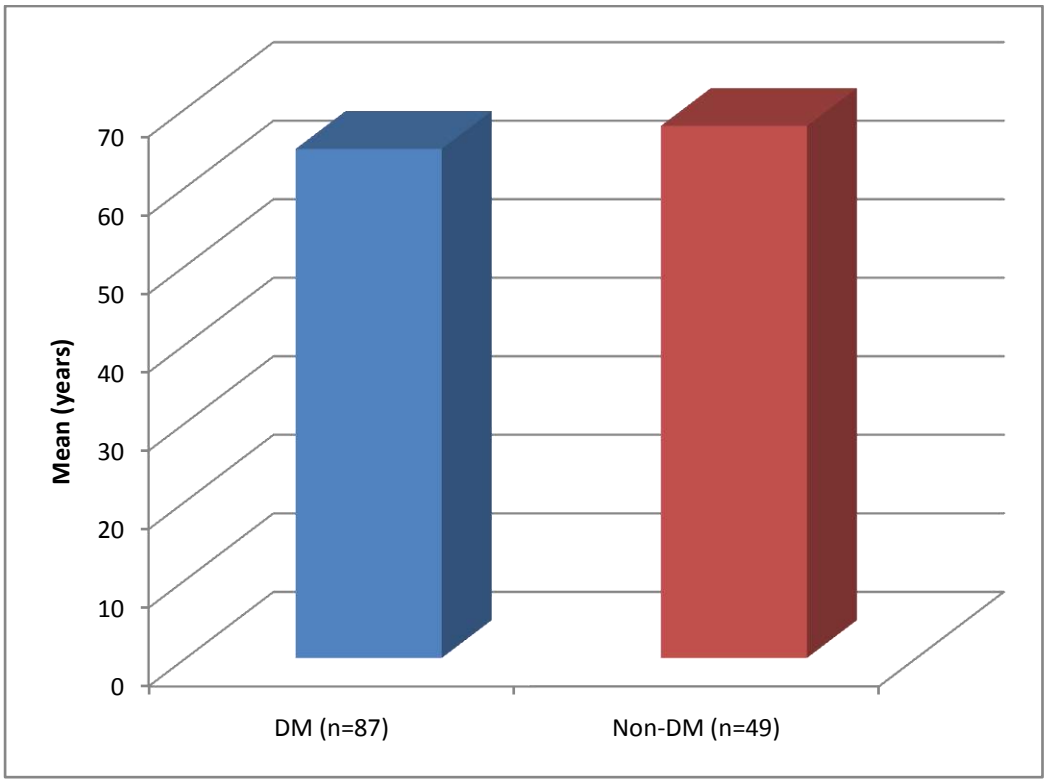


**Figure2: Age distribution in patients with acute heart failure among diabetics and non-diabetics**

**Table 3. Gender Distribution of Patients**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| Gender | Females | 48 | 55.2% | 26 | 53.1% | 74 | 0.812 |
| | Males | 39 | 44.8% | 23 | 46.9% | 62 | |

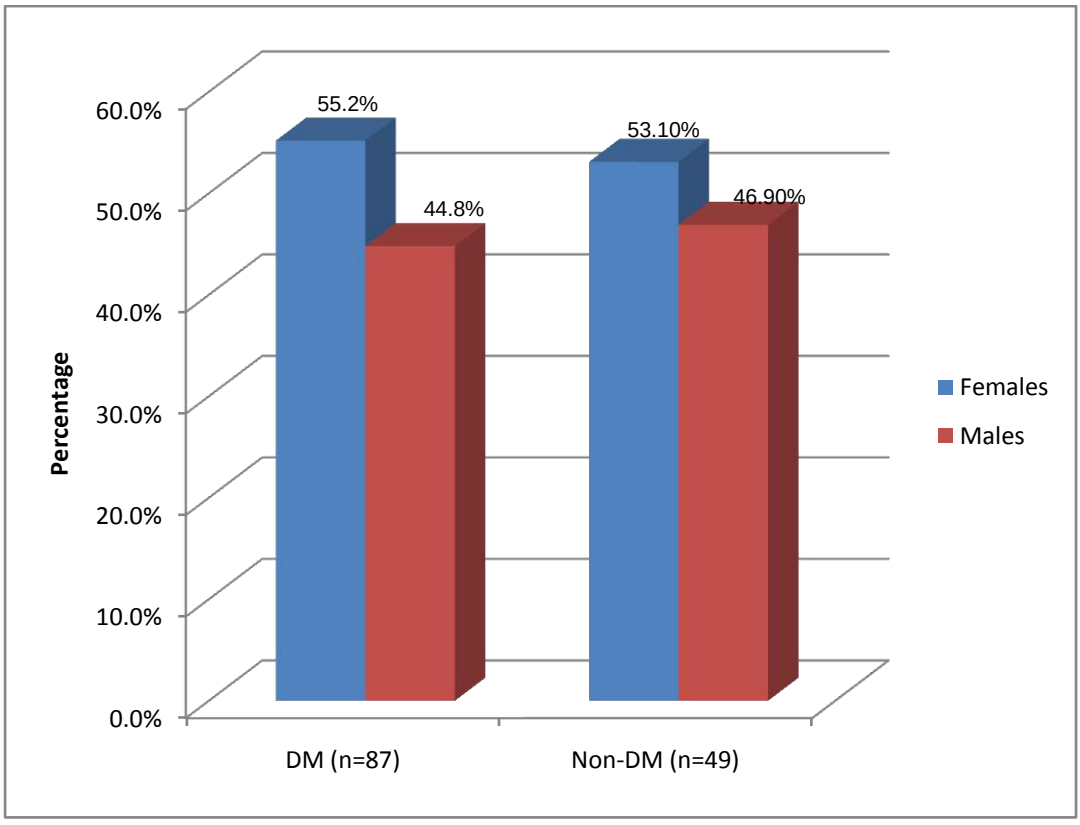


**Figure 3: Gender Distribution of Patients**

**Table 4. Duration of hospital stay in patients with acute heart failure among diabetics and non-diabetics**

| | DM (n=87) | | Non-DM (n=49) | | P-VALUE |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Hospital stay (days) | 11 | 6.29 | 8.31 | 5.59 | 0.014 |

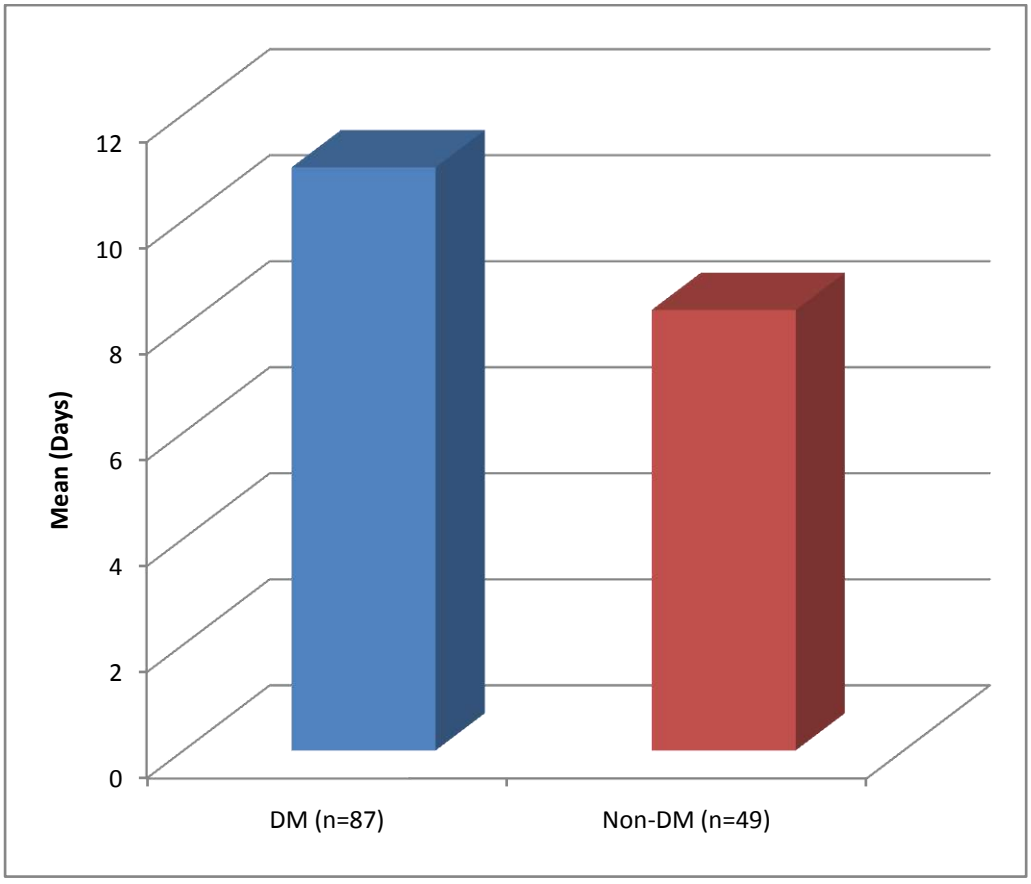


**Figure 4: Duration of hospital stay in patients with acute heart failure among diabetics and non-diabetics**

**TABLE 5. Presenting symptoms of patients with acute heart failure**

| | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|
| Breathlessness | 87 | 100.0% | 49 | 100.0% | 136 | |
| Feet swelling | 23 | 26.4% | 06 | 12.2% | 29 | 0.080 |
| Palpitation | 05 | 5.7% | 01 | 2.0% | 06 | 0.312 |
| Fatigue | 07 | 8.0% | 05 | 10.2% | 12 | 0.670 |
| Syncope | 04 | 4.6% | 02 | 4.1% | 06 | 0.888 |
| Chest pain | 11 | 12.6% | 07 | 14.3% | 18 | 0.786 |
| Orthopnea | 22 | 25.3% | 10 | 20.4% | 32 | 0.520 |
| PND | 13 | 14.9% | 04 | 8.2% | 17 | 0.251 |
| Fever | 13 | 14.9% | 06 | 12.2% | 19 | 0.663 |
| Surgical stress | 01 | 1.1% | 01 | 2.0% | 02 | 0.678 |

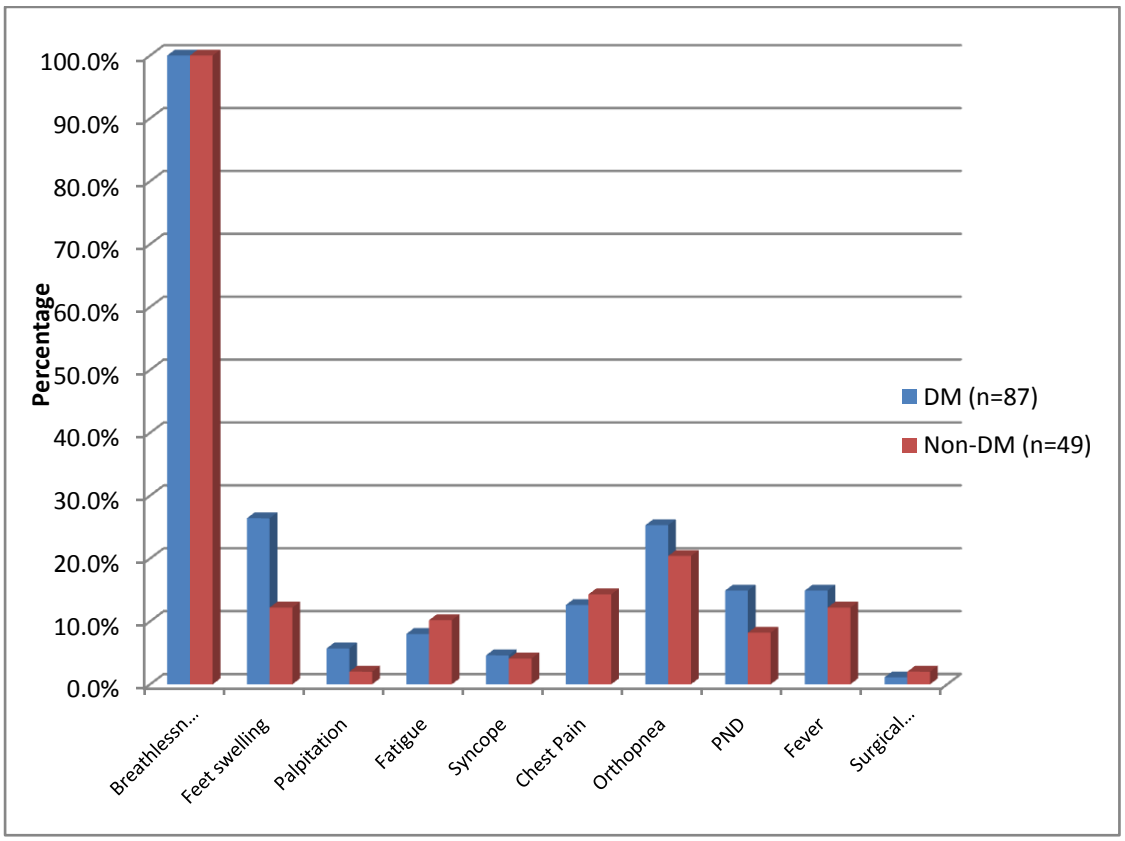


**Figure 5: Presenting symptoms of patients with acute heart failure**

**TABLE 6. Duration of presenting complaints among diabetics and non-diabetics having acute heart failure**

| Duration (days) | DM(n=87) | | Non-DM (n=49) | | P-VALUE |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Breathlessness | 10.9 | 16.18 | 5.88 | 10.58 | 0.053 |
| Feet swelling | 3.17 | 7.38 | 1.22 | 4.81 | 0.100 |
| Palpitation | 0.10 | 0.57 | 0.06 | 0.32 | 0.634 |
| Fatigue | 1.22 | 5.01 | 1.14 | 4.83 | 0.932 |
| Syncope | 0.05 | 0.21 | 0.10 | 0.59 | 0.421 |
| Chest Pain | 0.47 | 2.40 | 0.20 | 0.54 | 0.444 |
| Orthopnea | 3.21 | 13.52 | 0.71 | 1.89 | 0.202 |
| PND | 2.62 | 13.43 | 0.45 | 1.80 | 0.263 |
| Fever | 0.79 | 2.80 | 0.57 | 2.30 | 0.638 |
| Surgical stress | 0.06 | 0.54 | 0.00 | 0.00 | 0.455 |

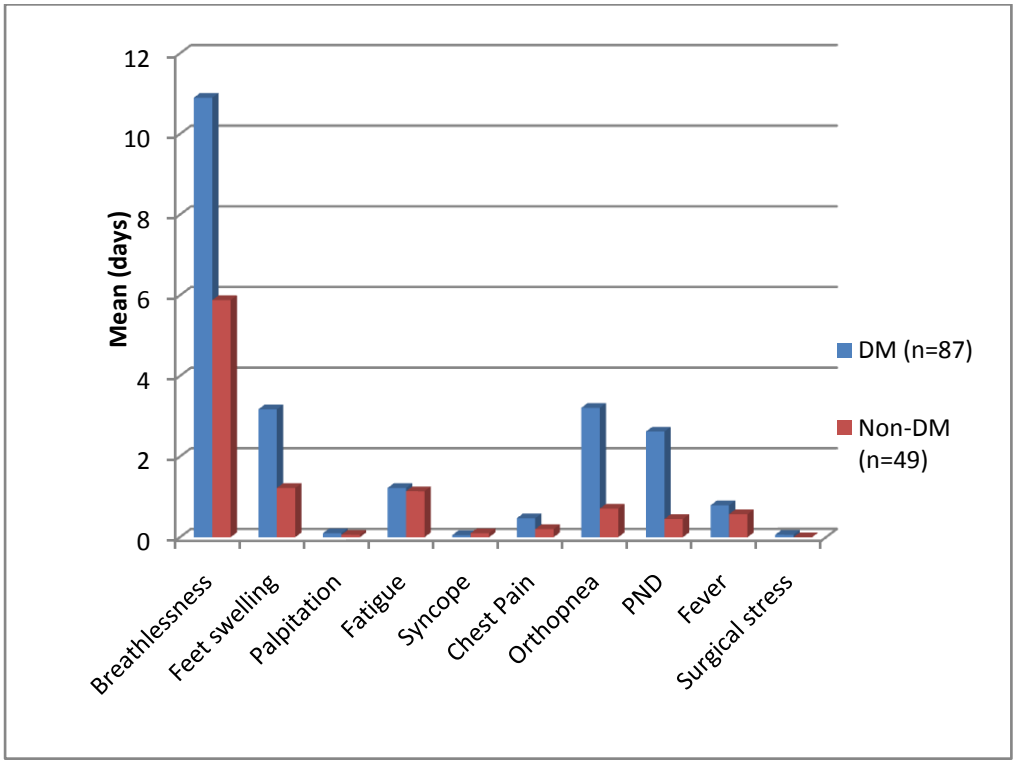


**Figure 6: Duration of presenting complaints among diabetics and non-diabetics having acute heart failure**

**TABLE 7. NYHA grading of dyspnea on admission**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| NYHA Grade on admission | 1 | 02 | 2.3% | 00 | 0.0% | 02 | 0.204 |
| | 2 | 13 | 14.9% | 14 | 28.6% | 27 | |
| | 3 | 38 | 43.7% | 19 | 38.8% | 57 | |
| | 4 | 34 | 39.1% | 16 | 32.7% | 50 | |

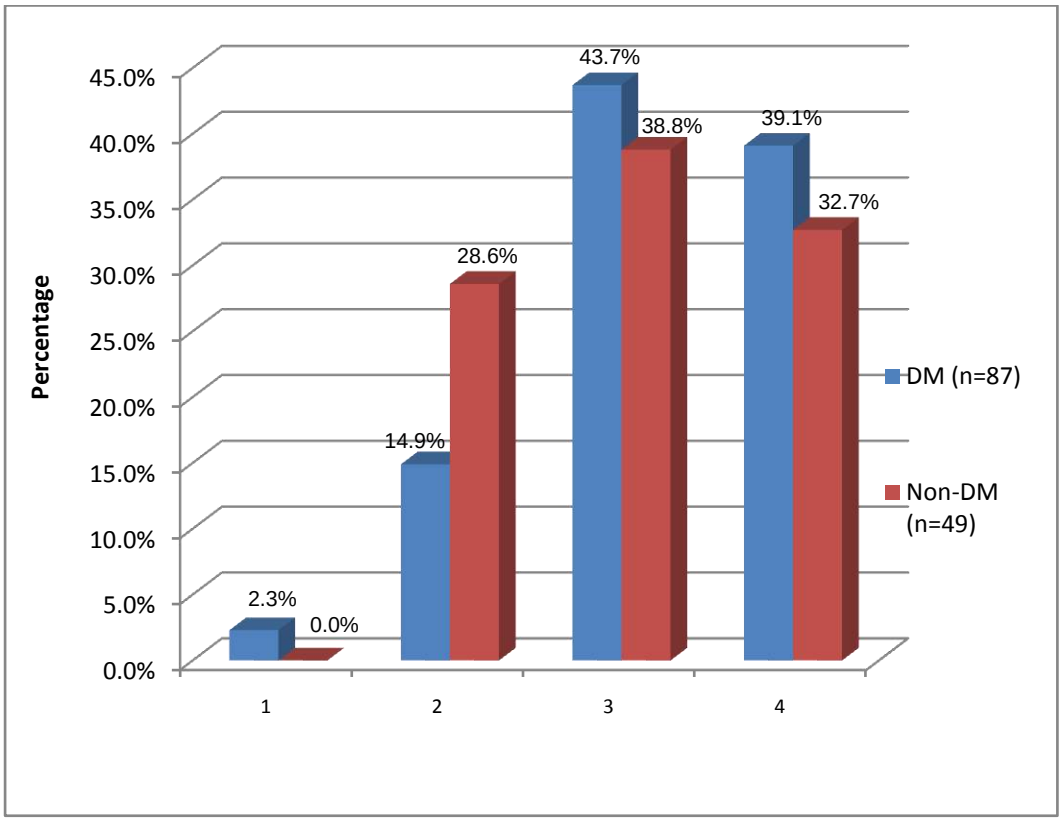


**Figure 7: NYHA grading of dyspnea on admission**

**TABLE 8. Past treatment history of patients with acute heart failure**

| | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|
| ACE-I or ARBs | 24 | 27.6% | 09 | 18.4% | 33 | 0.410 |
| CCBs | 18 | 20.7% | 18 | 36.7% | 36 | 0.046 |

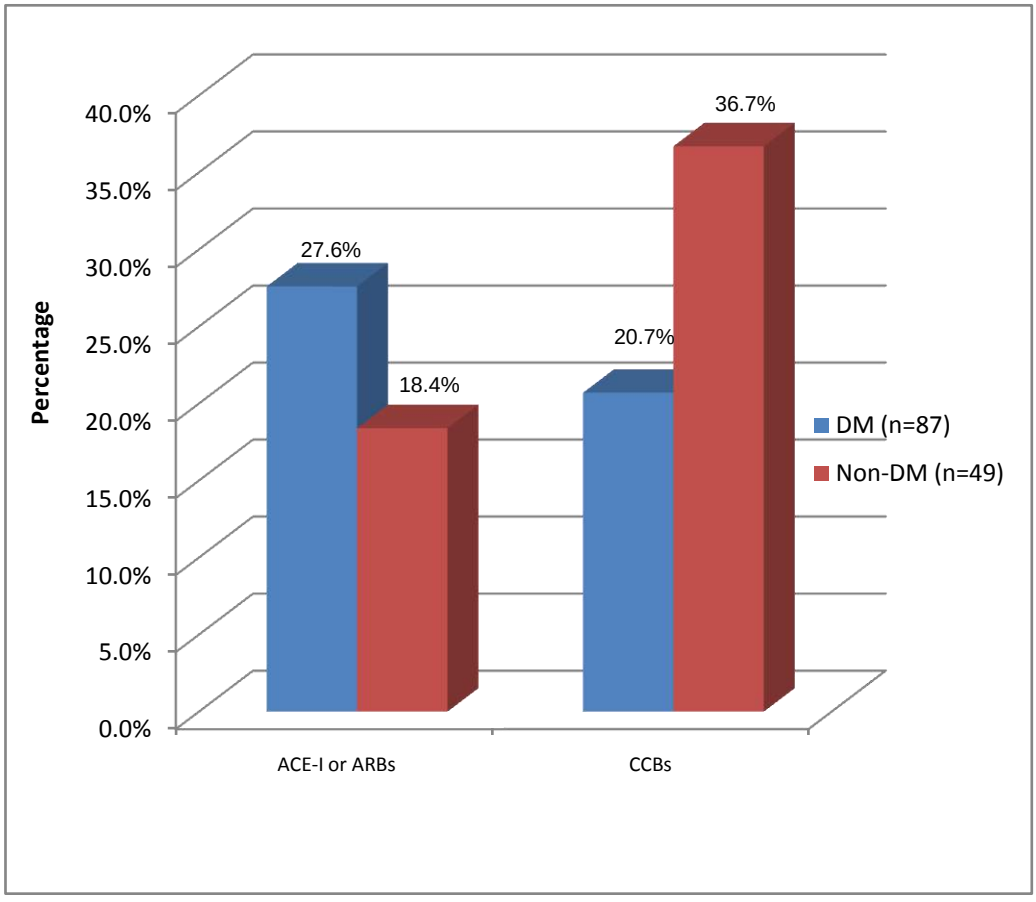


**Figure 8: Past treatment history of patients with acute heart failure**

**TABLE 9. Personal history of patients**

| | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|
| Alcohol | 13 | 26.4% | 26.5% | 23 | 36 | 0.990 |
| I/V drug abuse | 01 | 0.0% | 2.0% | 00 | 01 | 0.181 |
| Smoking | 07 | 3.4% | 14.3% | 03 | 10 | 0.020 |

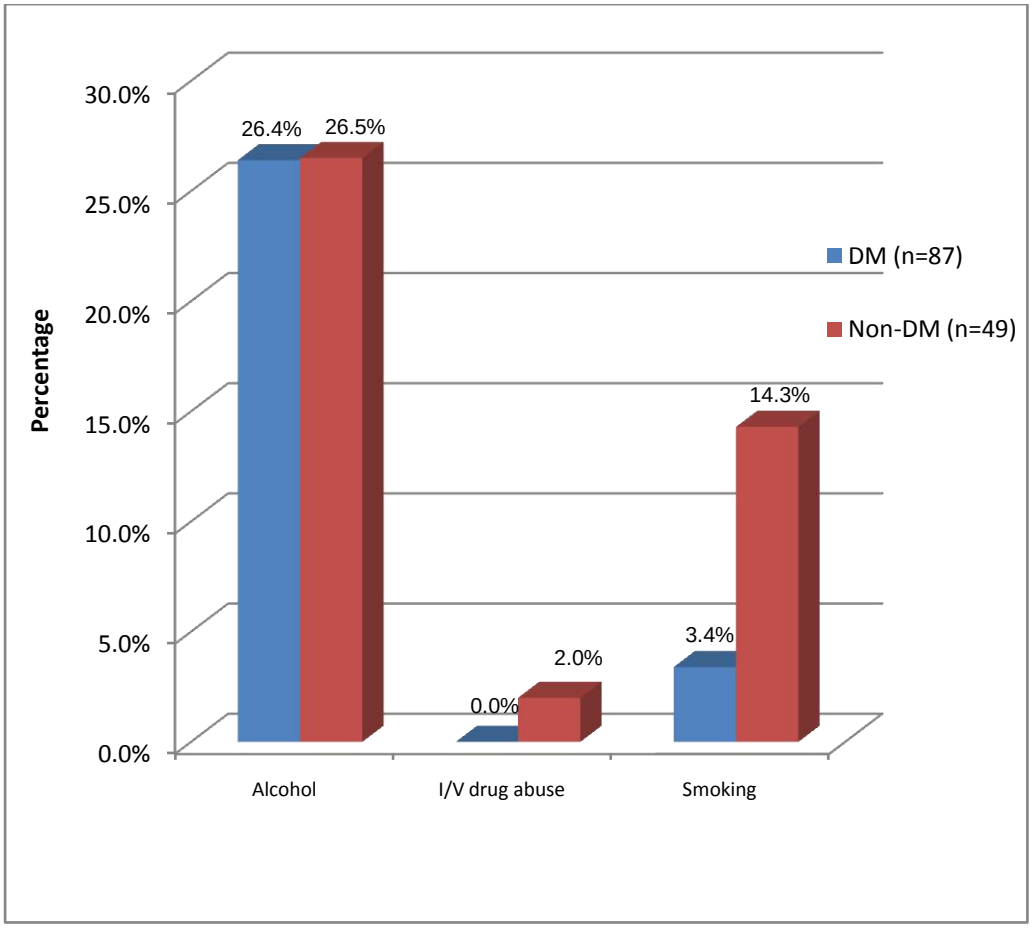


**Figure 9: Personal history of patients**

**TABLE10. Family history of diabetes**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| Family h/o DM-2 | NO | 51 | 58.6% | 33 | 67.3% | 84 | 0.315 |
| | YES | 36 | 41.4% | 16 | 32.7% | 52 | |

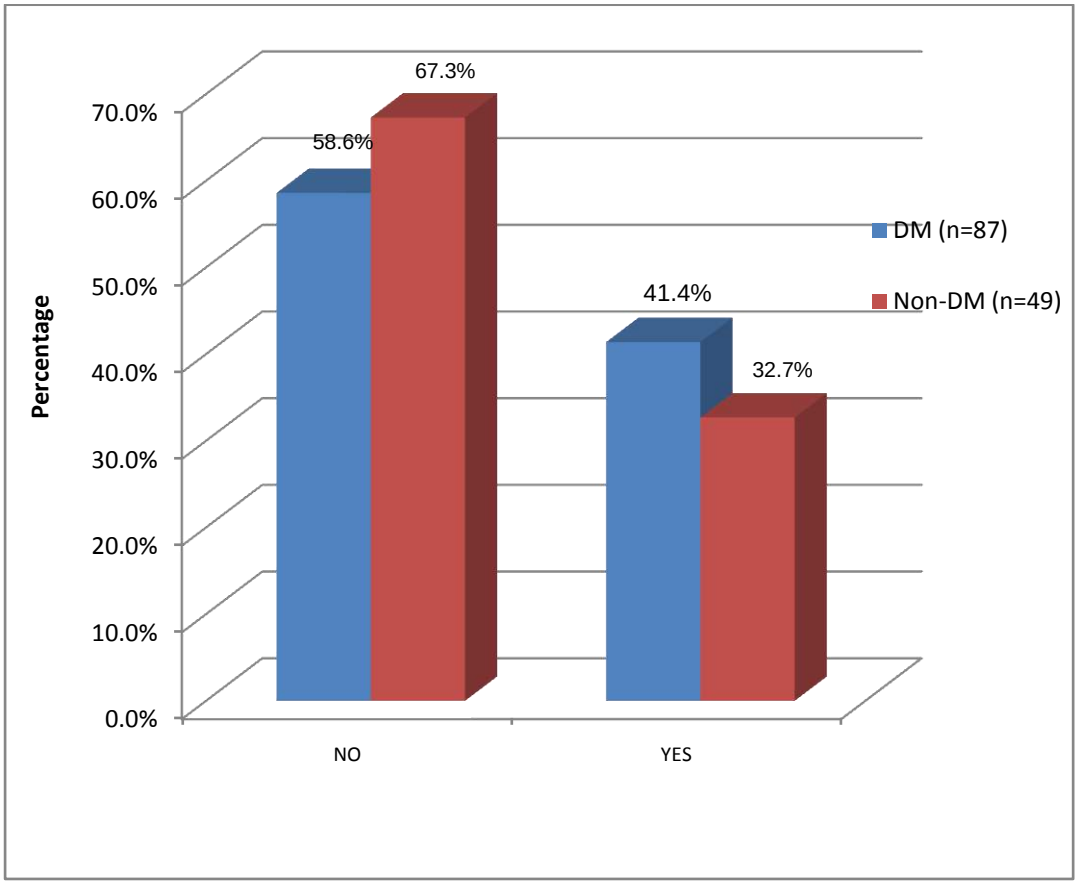


**Figure 10: Family history of diabetes**

**TABLE11.General physical examination of study group**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| Pallor | - | 79 | 90.8% | 46 | 93.9% | 125 | 0.528 |
| | + | 08 | 9.2% | 03 | 6.1% | 11 | |
| Edema | - | 50 | 57.5% | 34 | 69.4% | 84 | 0.170 |
| | + | 37 | 42.5% | 15 | 30.6% | 52 | |
| JVP | Not Raised | 64 | 73.6% | 40 | 81.6% | 104 | 0.178 |
| | Raised | 23 | 26.4% | 09 | 18.4% | 32 | |

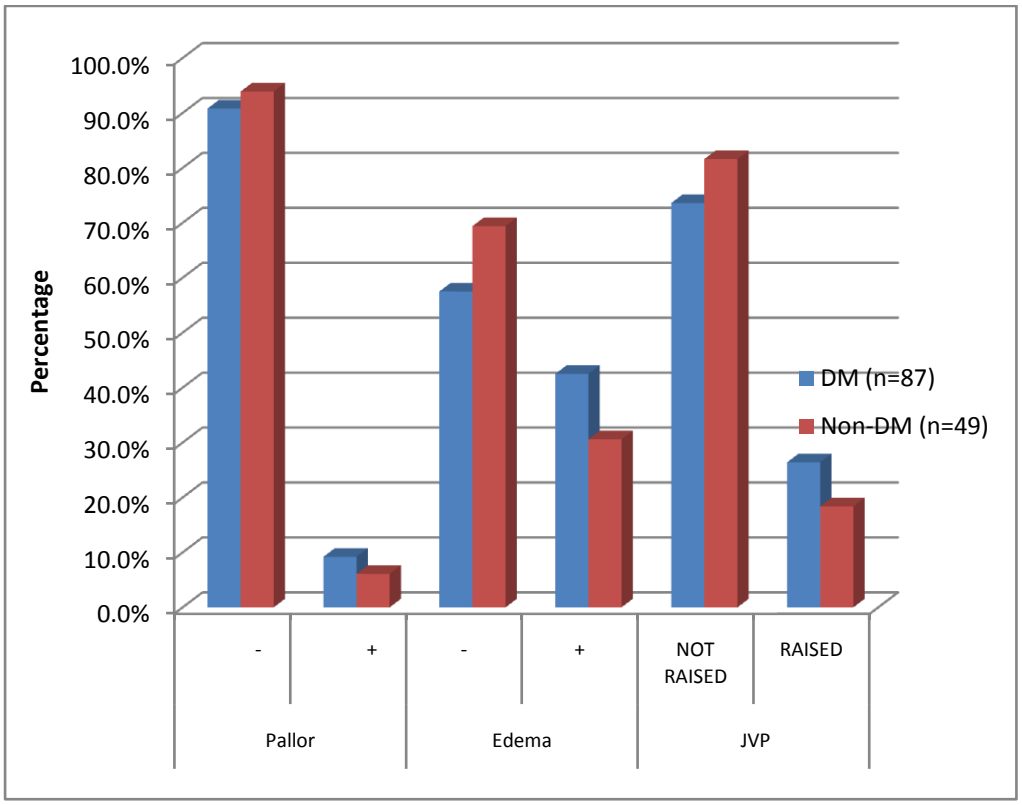


**Figure11: General physical examination of study group**

**TABLE 12. Systemic examination of admitted patients**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| Pulmonary Rales | - | 25 | 28.7% | 23 | 46.9% | 48 | 0.033 |
| | + | 62 | 71.3% | 26 | 63.1% | 88 | |
| Hepatomegaly | - | 79 | 90.8% | 47 | 95.9% | 126 | 0.273 |
| | + | 08 | 9.2% | 02 | 4.1% | 10 | |

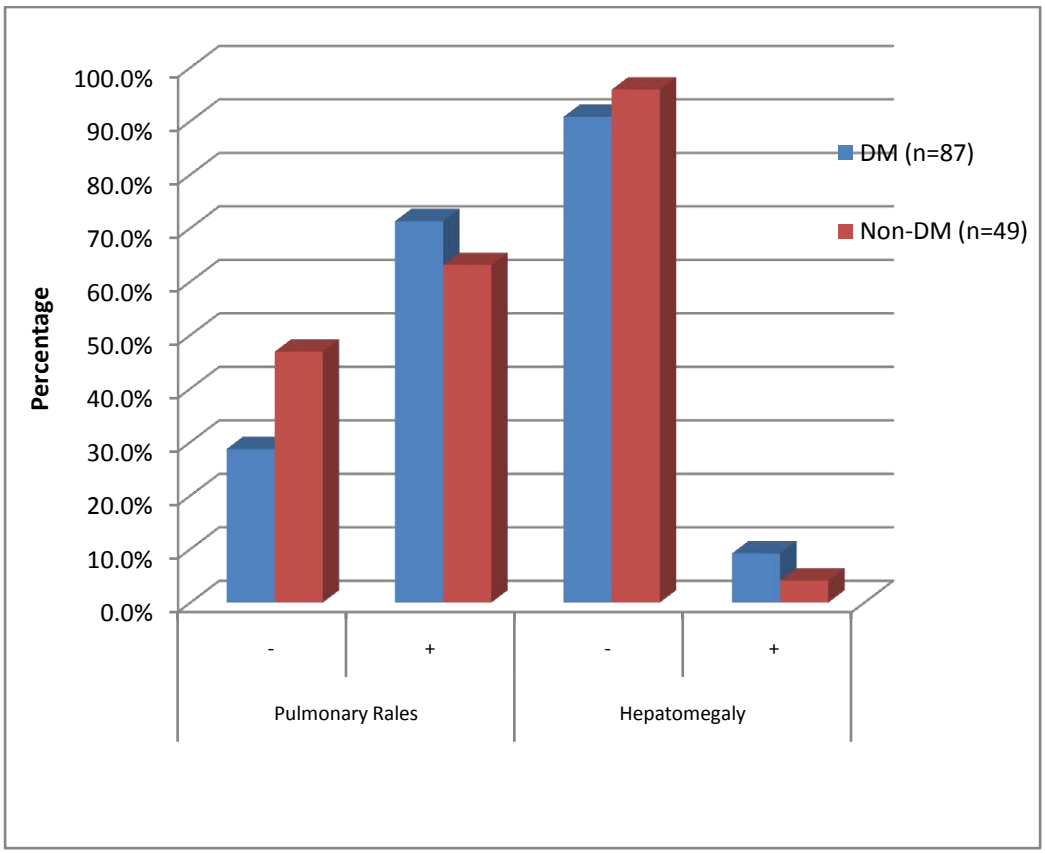


**Figure 12: Systemic examination of admitted patients**

**TABLE 13A. Vitals of admitted patients with acute heart failure**

| | DM (n=87) | | Non-DM (n=49) | | P-VALUE |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Pulse (/min) | 92.48 | 17.25 | 95.35 | 21.51 | 0.397 |
| SBP* (mm/Hg) | 121.82 | 28.05 | 125.63 | 27.52 | 0.444 |
| DBP* (mm/Hg) | 74.78 | 17.53 | 75.43 | 14.60 | 0.827 |
| RR (/min) | 21.47 | 3.31 | 22.12 | 3.75 | 0.296 |
| SPO2** (%) | 94.67 | 6.23 | 95.76 | 2.80 | 0.249 |

*Some patients were on inotropic support

**Some patients were on supplemental oxygen support

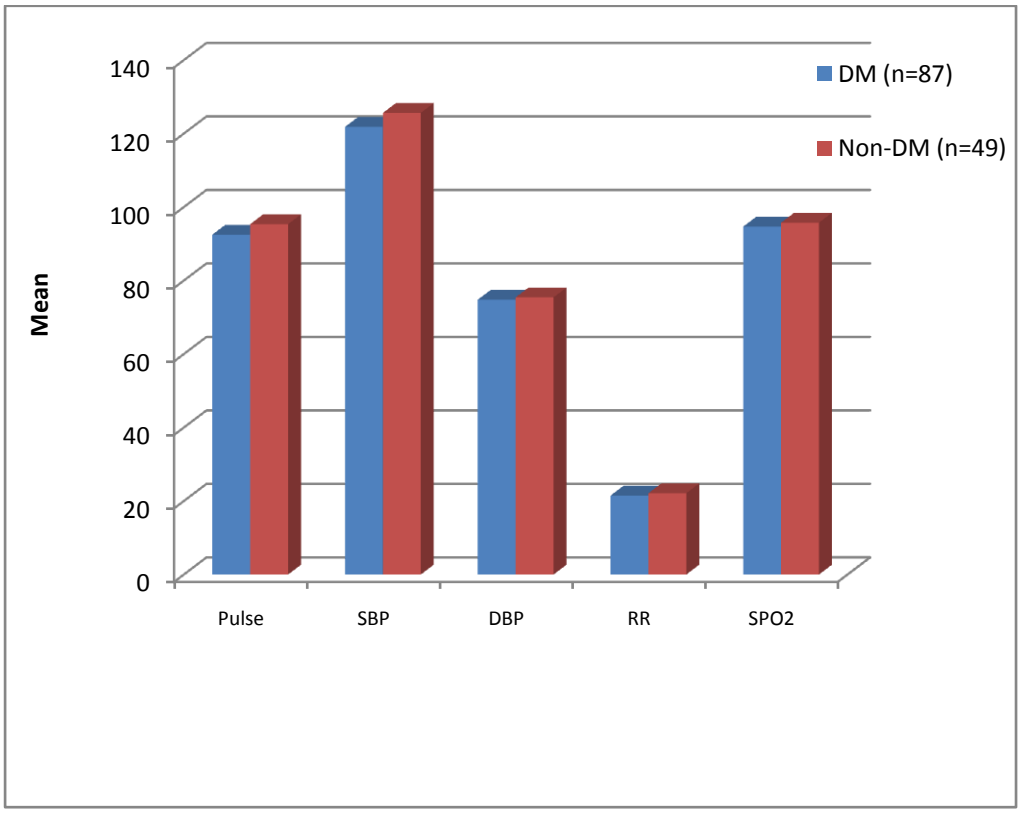


**Figure 13A: Vitals of admitted patients with acute heart failure**

**TABLE 13B. BMI of patients having acute heart failure among both study groups**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| BMI group | Normal* | 36 | 41.4% | 34 | 69.4% | 70 | 0.002 |
| | Overweight** | 38 | 43.7% | 15 | 30.6% | 53 | 0.001 |
| | Obese*** | 13 | 14.9% | 00 | 0.0% | 13 | 0.004 |

*BMI= 18.5- <25.0 kg/$m^2$

**BMI= 25.0- <30.0kg/$m^2$

***BMI= >30.0 kg/$m^2$

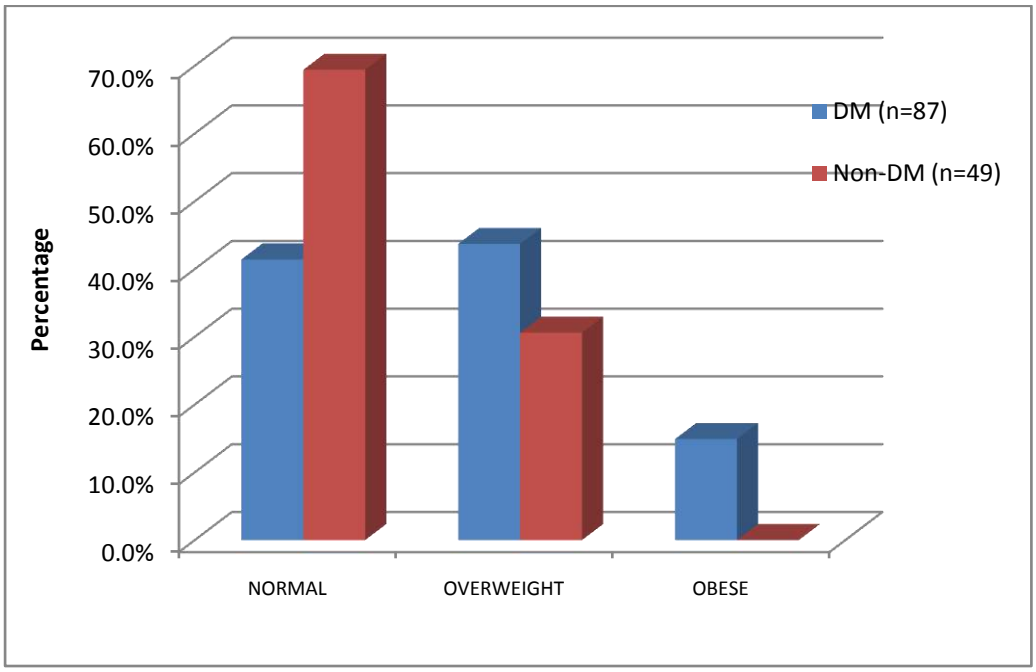


**FIGURE 13B: BMI of patients having acute heart failure among both study groups**

**TABLE14A. Routine investigations of patients**

| | DM (n=87) | | Non-DM (n=49) | | P-VALUE |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Hemoglobin (g/dl) | 10.37 | 2.10 | 11.80 | 2.38 | 0.000 |
| TLC ($X10^3/mm^3$) | 10.87 | 5.00 | 12.83 | 6.26 | 0.047 |
| Platelets($X10^3/mm^3$) | 238.36 | 91.46 | 240.69 | 92.17 | 0.887 |
| MCV (fl) | 83.30 | 6.59 | 84.32 | 13.68 | 0.561 |
| MCH (pg) | 27.37 | 3.14 | 28.89 | 7.03 | 0.086 |
| MCHC (gm/dl) | 31.78 | 5.73 | 31.03 | 1.89 | 0.376 |
| ESR (mm/hr) | 43.48 | 30.90 | 32.37 | 22.06 | 0.028 |
| Creatinine (mg/dl) | 1.19 | 0.39 | 1.14 | 0.40 | 0.517 |
| Urea (mg/dl) | 53.03 | 26.80 | 49.39 | 27.28 | 0.450 |
| Sodium (mmol/l) | 134.99 | 6.00 | 135.84 | 8.81 | 0.507 |
| Potassium (mmol/l) | 4.39 | 0.67 | 4.22 | 0.76 | 0.170 |
| Chloride (mmol/l) | 99.16 | 7.32 | 100.90 | 8.41 | 0.211 |
| RBS (mg/dl) | 250.41 | 119.91 | 131.27 | 52.10 | 0.000 |
| HbA1C (%) | 9.44 | 2.14 | 5.10 | 0.74 | 0.000 |
| BNP Levels (pg/ml) | 1403.56 | 1422.81 | 1117.45 | 1105.56 | 0.226 |
| Trop-T (ng/ml) levels (where applicable) | 0.39 | 0.81 | 0.28 | 0.85 | 0.589 |

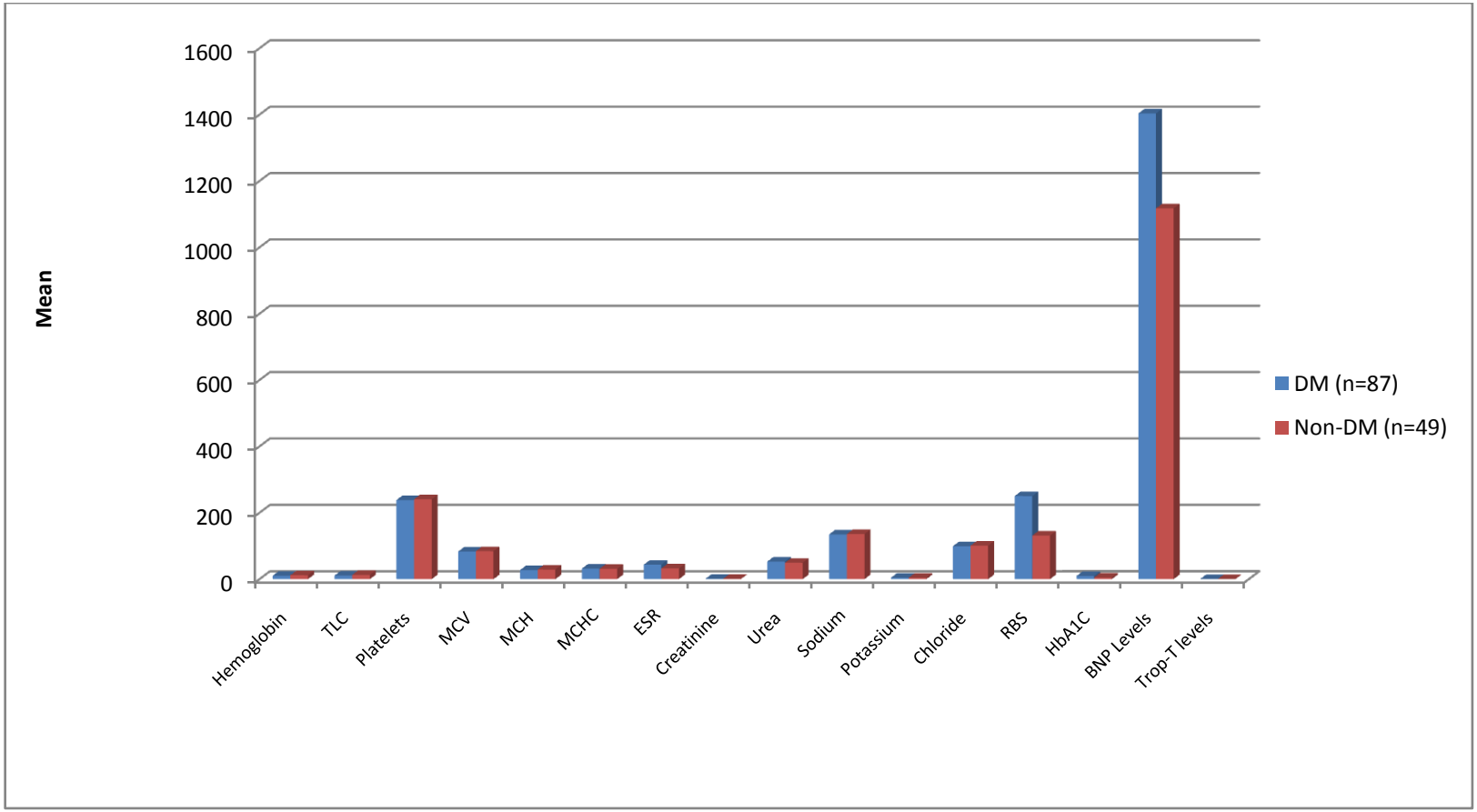


**Figure 14A: Routine investigations of patients**

**TABLE 14B. ECG changes among diabetic and non-diabetic patients**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| **ECG** | Arrhythmia* | 07 | 8.0% | 08 | 16.3% | 15 | 0.551 |
| | AV Block | 01 | 1.1% | 01 | 2.0% | 02 | |
| | BBB** | 10 | 11.5% | 07 | 14.3% | 17 | |
| | CAD | 03 | 3.4% | 02 | 4.1% | 05 | |
| | LVH | 04 | 4.6% | 04 | 8.2% | 08 | |
| | NSR | 33 | 37.9% | 17 | 34.7% | 50 | |
| | ST-T Changes | 29 | 33.3% | 10 | 20.4% | 39 | |

*Arrhythmia includes atrial flutter and atrial fibrillation

** BBB includes RBBB, LBBB and Bifascicular block

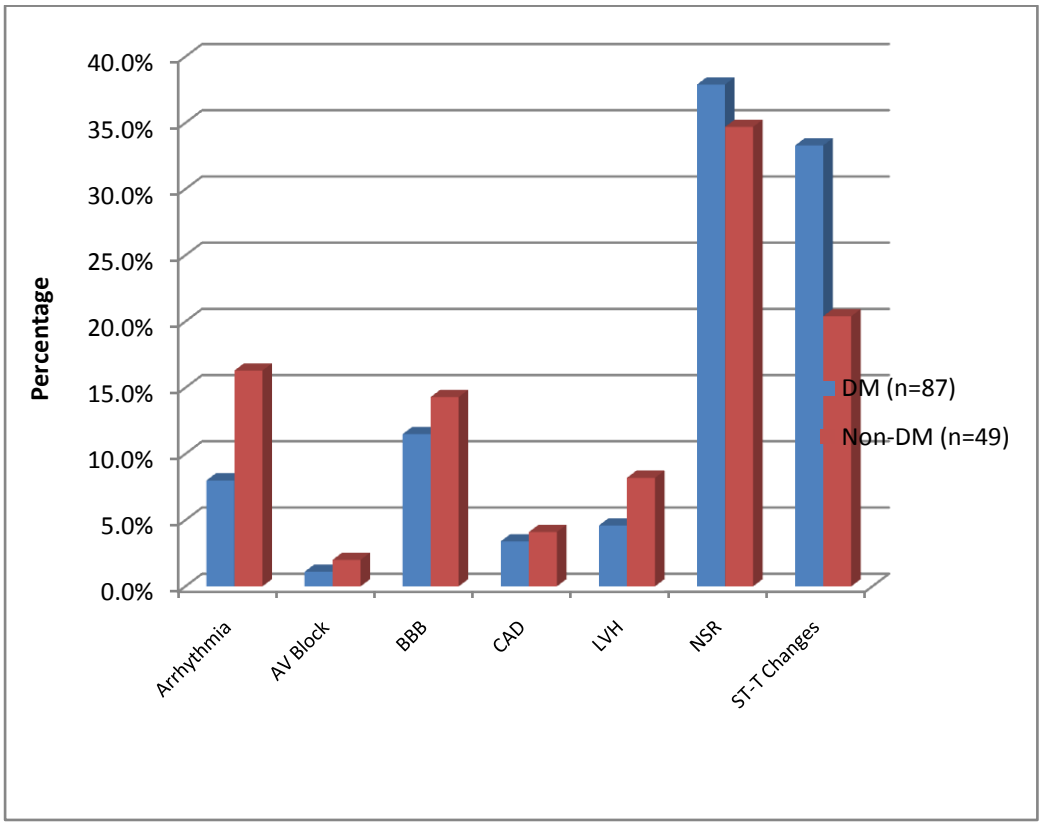


**Figure 14B: ECG changes among diabetic and non-diabetic patients**

**TABLE 15A. Echocardiographic findings of acute heart failure patients**

| | DM (n=87) | | Non-DM (n=49) | | P-VALUE |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Aortic Root (mm) | 27.99 | 3.68 | 27.67 | 3.61 | 0.630 |
| Left Atrium (mm) | 40.82 | 6.74 | 42.98 | 8.12 | 0.098 |
| Right Atrium (mm) | 26.33 | 10.91 | 24.88 | 9.18 | 0.431 |
| RVID (D) (mm) | 26.60 | 8.34 | 23.98 | 5.38 | 0.050 |
| IVST (D) (mm) | 9.93 | 2.85 | 9.82 | 2.84 | 0.822 |
| IVST (S) (mm) | 11.67 | 3.16 | 11.53 | 2.91 | 0.805 |
| LVID (D) (mm) | 54.23 | 11.39 | 50.10 | 12.52 | 0.052 |
| LVID (S) (mm) | 42.98 | 12.19 | 39.67 | 12.49 | 0.135 |
| LVPW (D/S) (mm) | 10.08 | 2.34 | 10.78 | 3.86 | 0.194 |
| LVPW (S) (mm) | 11.61 | 2.52 | 11.88 | 2.55 | 0.554 |
| EF (%) | 37.25 | 13.81 | 41.24 | 15.25 | 0.122 |
| Fractional Shortening (%) | 18.84 | 6.75 | 20.87 | 7.87 | 0.126 |
| E/A Ratio | 1.23 | 0.63 | 1.04 | 0.59 | 0.276 |

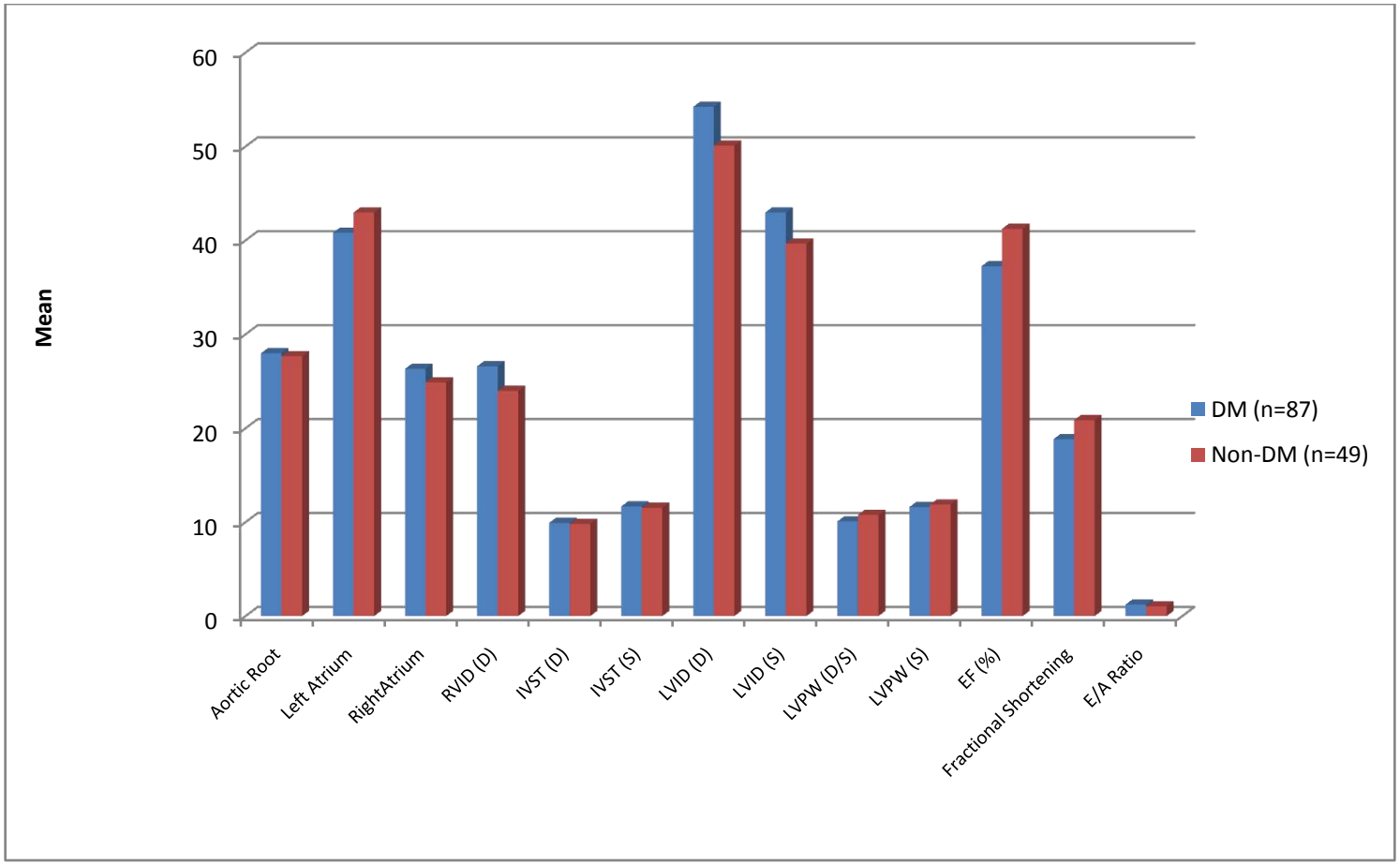


**Figure 15 A: Echocardiographic findings of acute heart failure patients**

**TABLE 15 B. Severity of mitral regurgitation among both groups**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| Associated MR | No | 28 | 32.2% | 25 | 51.0% | 53 | 0.163 |
| | Mild | 31 | 35.6% | 13 | 26.5% | 44 | |
| | Moderate | 27 | 31.0% | 10 | 20.5% | 37 | |
| | Severe | 01 | 1.1% | 01 | 2.0% | 02 | |

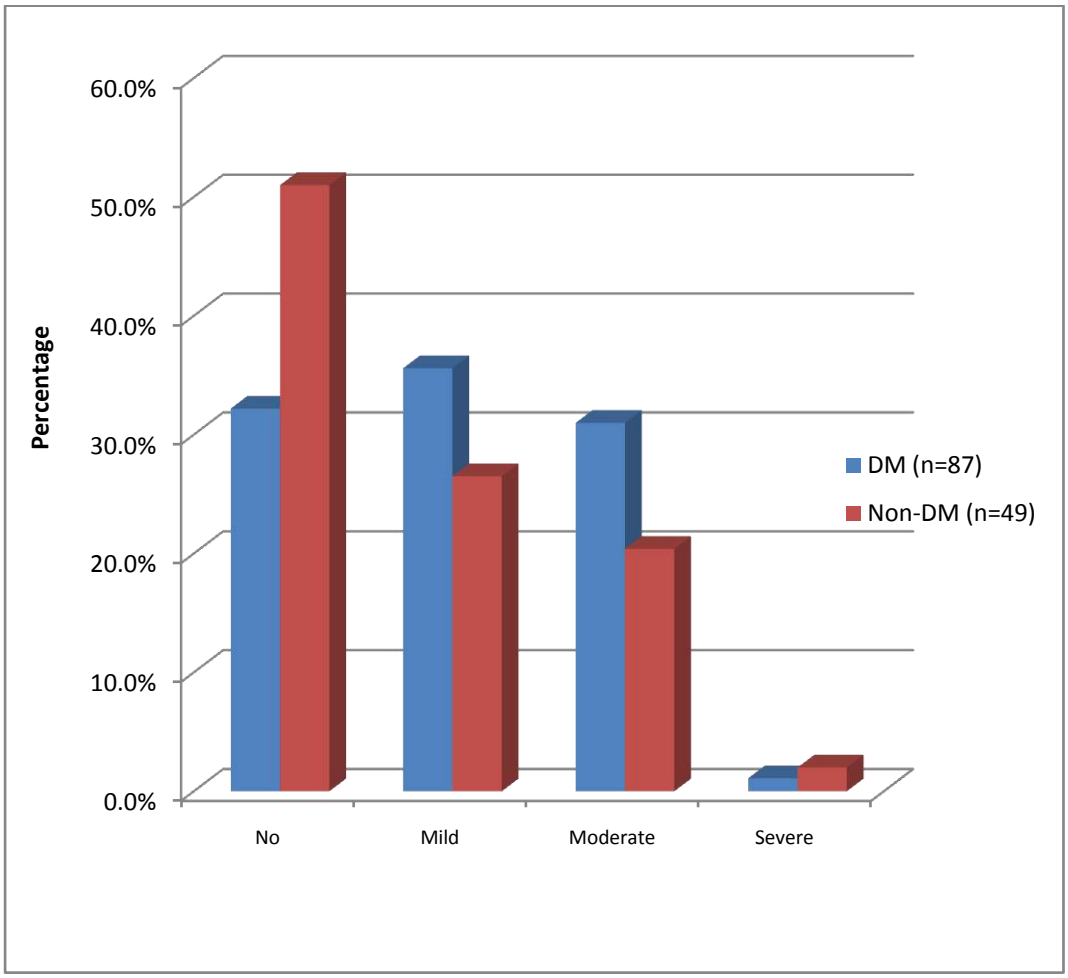


**Figure 15 B: Severity of mitral regurgitation among both groups**

**TABLE 15C. Patients having CAD among diabetic and non-diabetic patients**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| CAD | No | 35 | 40.2% | 31 | 63.3% | 66 | 0.010 |
| | Yes | 52 | 59.8% | 18 | 36.7% | 70 | |

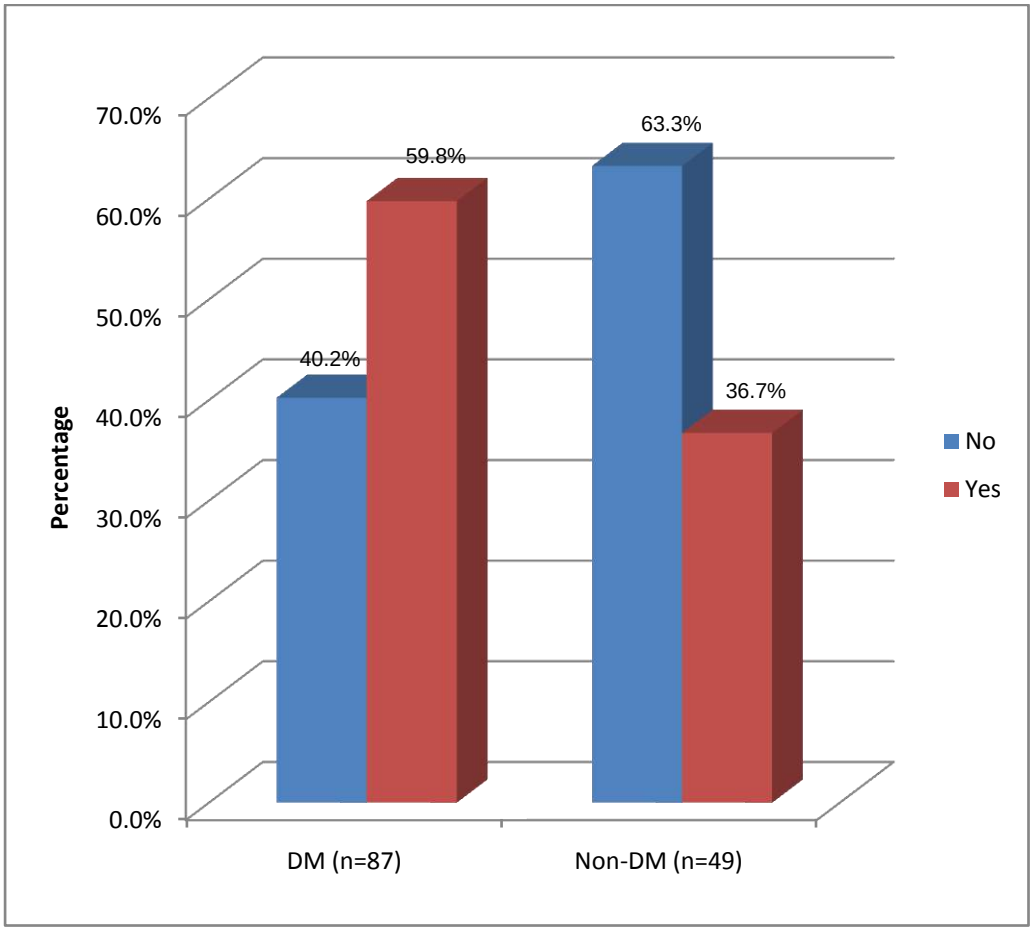


**FIGURE 15C: Patients having CAD among diabetic and non-diabetic patients**

**TABLE 15D. Comparison of type of heart failure in patients without CAD**

| | | DM (n=87) | | Non- DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| Type of heart failure | HFnEF* | 18 | 51.4% | 16 | 51.6% | 34 | 0.885 |
| | HFmrEF** | 02 | 5.7% | 01 | 3.2% | 03 | |
| | HFrEF*** | 15 | 42.9% | 14 | 45.2% | 29 | |
| Total | | 35 | 100.0% | 31 | 100.0% | 66 | |

*HFnEF: Heart Failure with normal Ejection Fraction (≥50%)

**HFmrEF: Heart Failure with mid-range Ejection Fraction (40-49%)

*** HFrEF: Heart Failure with reduced Ejection Fraction (<40%)

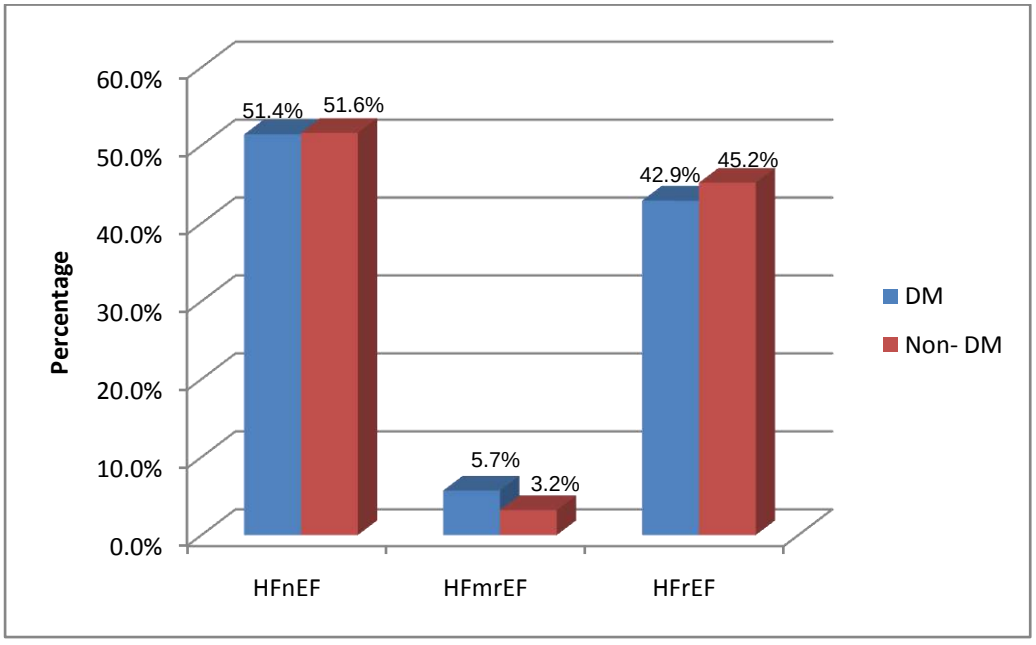


**Figure 15D: Comparison of types of heart failure in patients without CAD**

**TABLE 16. Discharge status of patients**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| Discharged/ Death | DAMA | 01 | 1.1% | 02 | 4.1% | 03 | 0.533 |
| | Death | 04 | 4.6% | 02 | 4.1% | 06 | |
| | Discharged | 82 | 94.3% | 45 | 91.8% | 127 | |

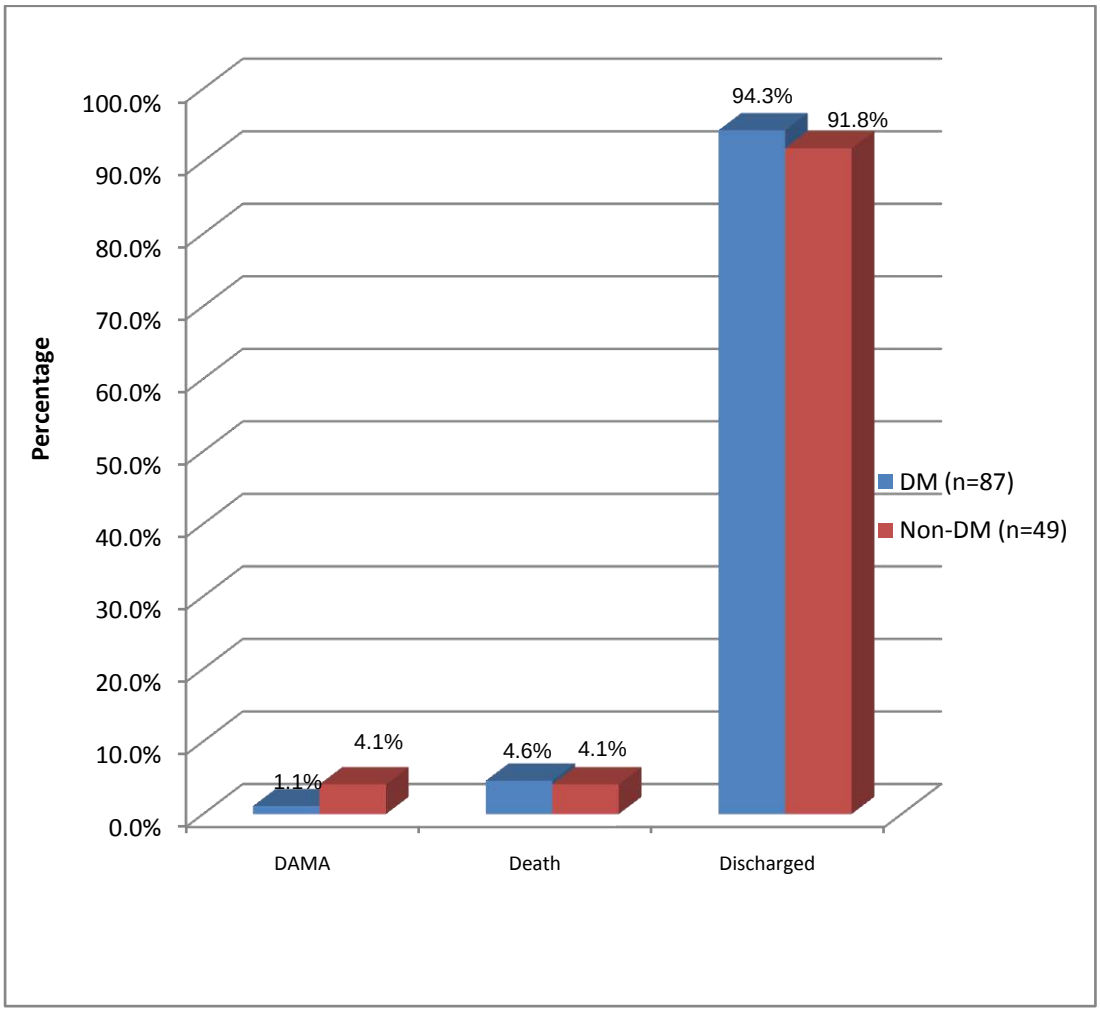


**Figure 16: Discharge status of patients**

**TABLE 17. Survival status on follow-up at 1 month and 3 months**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| Survival Status At 1 month | Alive | 81 | 93.1% | 46 | 93.9% | 127 | 0.862 |
| | Dead | 06 | 6.9% | 03 | 6.1% | 09 | |
| Survival Status At 3 months | Alive | 77 | 88.5% | 44 | 89.8% | 121 | 0.818 |
| | Dead | 10 | 11.5% | 5 | 10.2% | 15 | |

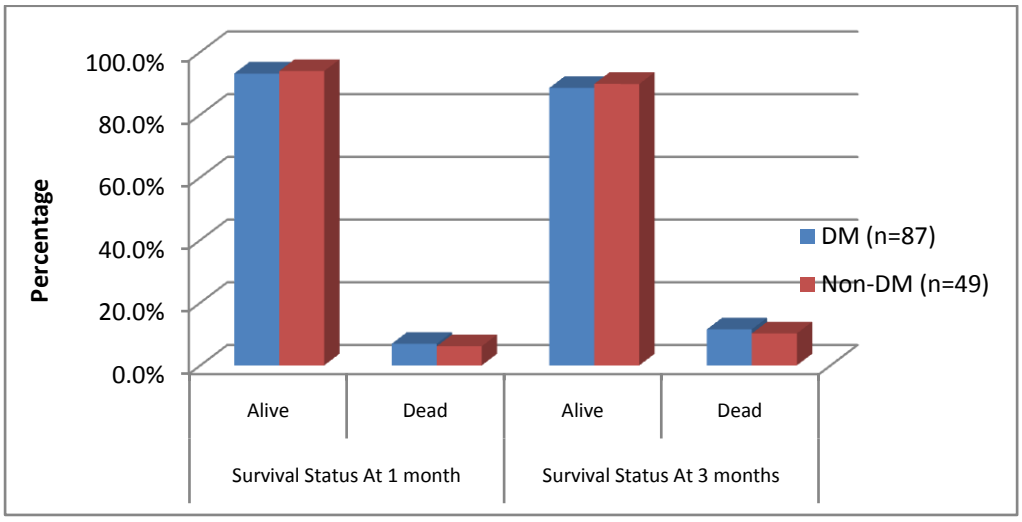


**FIGURE 17A: Survival status on follow-up at 1 month and 3 months**

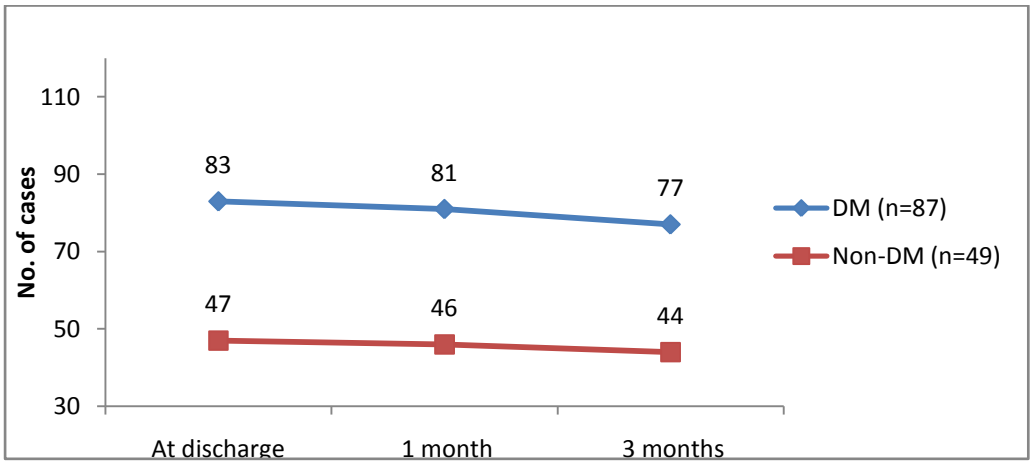


**FIGURE 17B: Line diagram showing trend of survival status at discharge, at 1 month and at 3 months**

**TABLE 18A. At 1 month, NYHA grading among diabetic and non-diabetics**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| NYHA Grade at 1 month | 1 | 21 | 24.1% | 12 | 24.5% | 33 | 0.827 |
| | 2 | 55 | 63.2% | 28 | 57.1% | 83 | |
| | 3 | 05 | 5.7% | 04 | 8.2% | 09 | |
| | NA | 06 | 6.9% | 05 | 10.2% | 11 | |

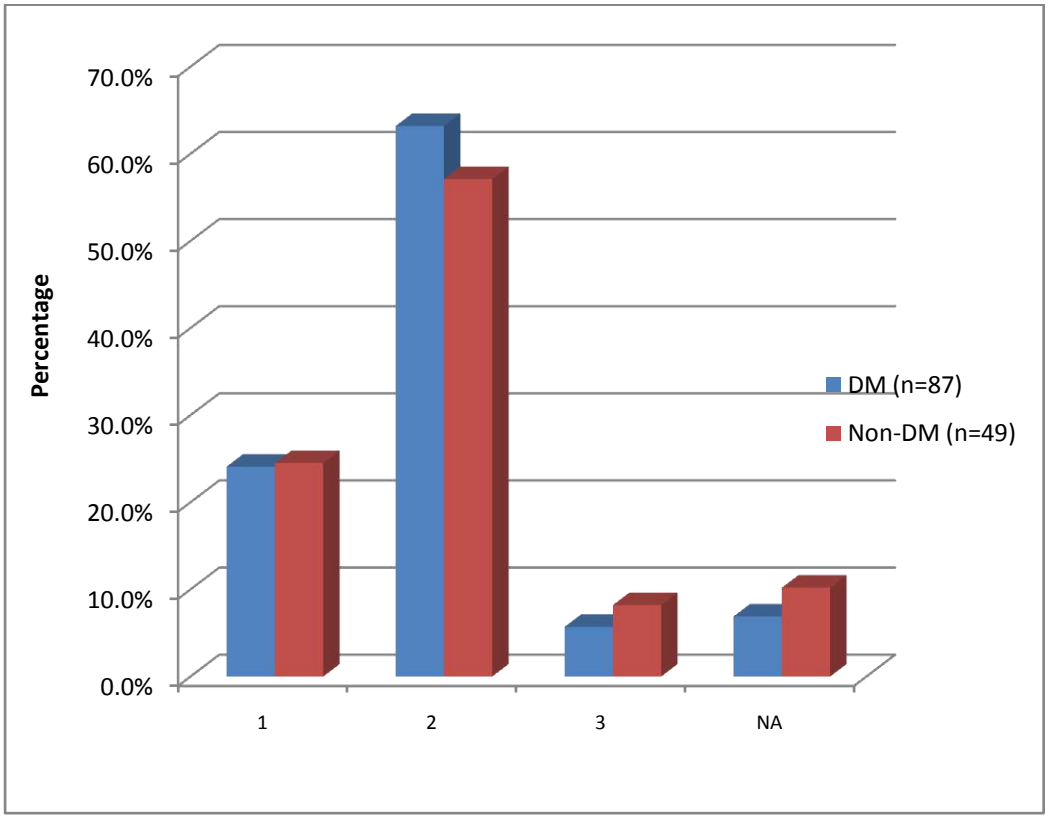


**Figure 18A: At 1 month, NYHA grading among diabetic and non-diabetics**

**TABLE 18B: At 3 months, NYHA grading among both groups**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| NYHA Grade at 3 months | 1 | 17 | 19.5% | 16 | 32.7% | 33 | 0.335 |
| | 2 | 43 | 49.4% | 21 | 42.9% | 64 | |
| | 3 | 15 | 17.2% | 04 | 8.2% | 19 | |
| | 4 | 02 | 2.3% | 01 | 2.0% | 03 | |
| | NA | 10 | 11.5% | 07 | 14.3% | 17 | |

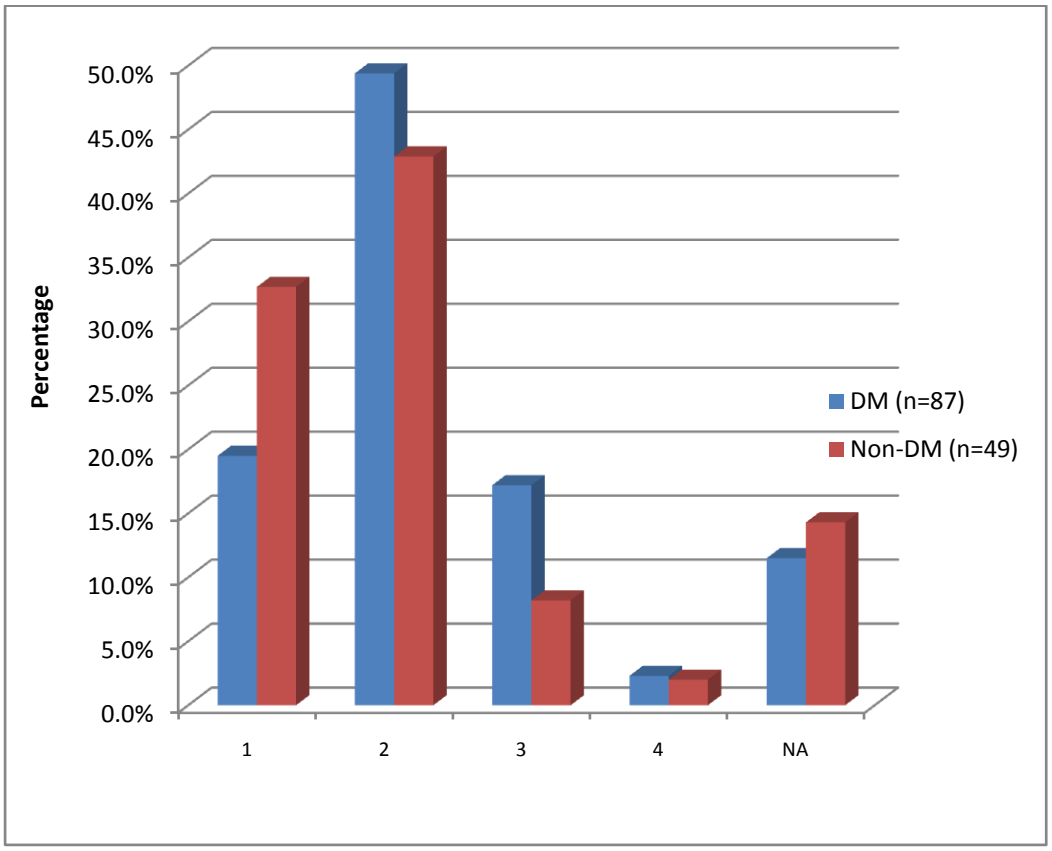


**Figure 18B: At 3 months, NYHA grading among both groups**

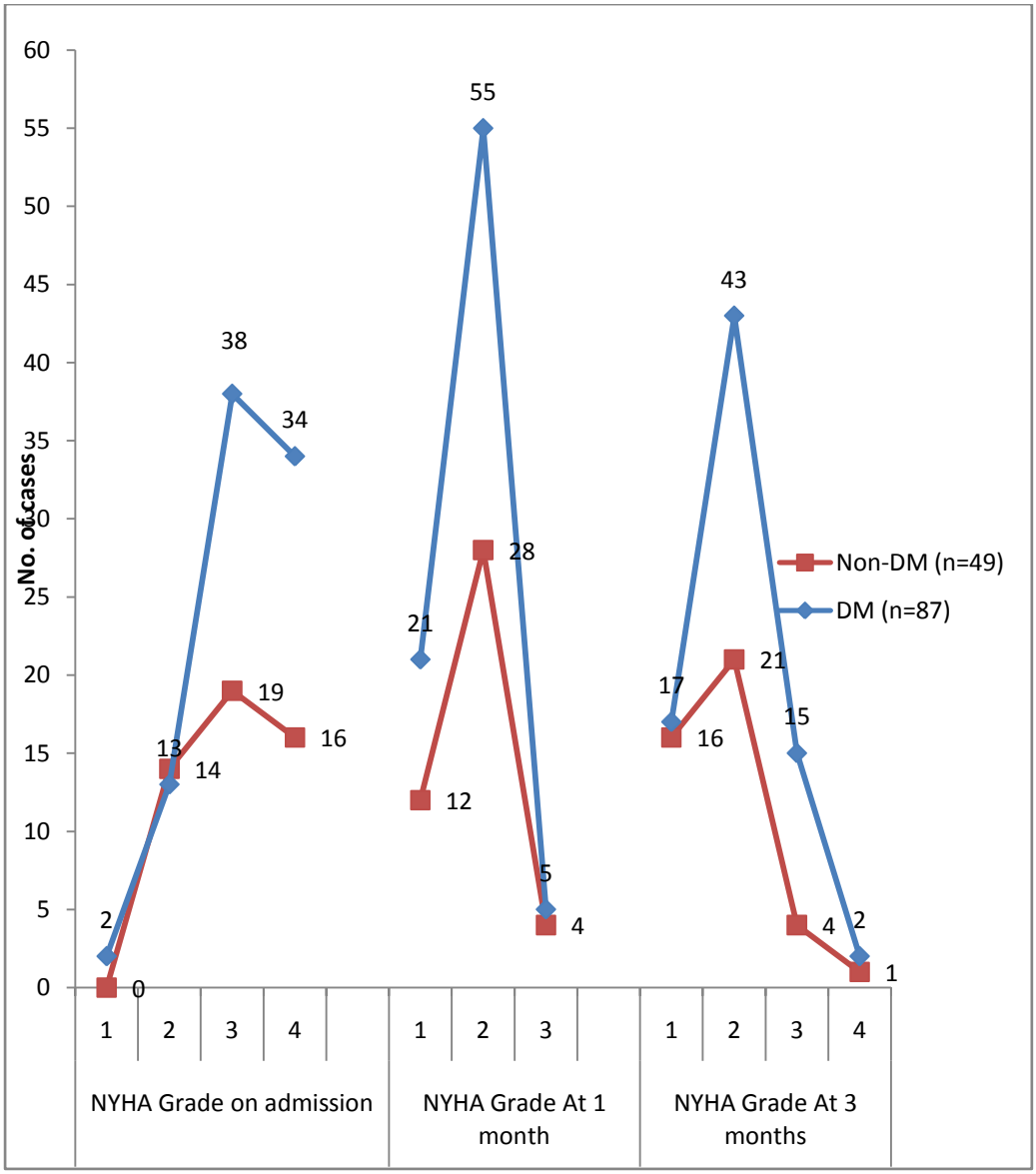


**Figure 18C: Line Diagram showing NYHA grading among both groups on admission, at 1 month and at 3 months**

**TABLE 19. Treatment given in hospital to patients with acute heart failure**

| | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|
| Antiplatelet | 84 | 96.6% | 41 | 83.7% | 125 | 0.024 |
| Statin | 86 | 98.9% | 43 | 87.8% | 129 | 0.005 |
| Diuretics | 86 | 98.9% | 48 | 98.0% | 134 | 0.678 |
| ACE-I or ARB | 35 | 40.2% | 17 | 34.7% | 52 | 0.644 |
| CCBs | 04 | 4.6% | 08 | 16.3% | 12 | 0.021 |
| Vasodilator | 23 | 26.4% | 12 | 24.5% | 35 | 0.803 |
| Mineralocorticoid Antagonist | 22 | 25.3% | 09 | 18.4% | 31 | 0.356 |
| Beta-Blockers | 17 | 19.5% | 12 | 24.5% | 29 | 0.499 |

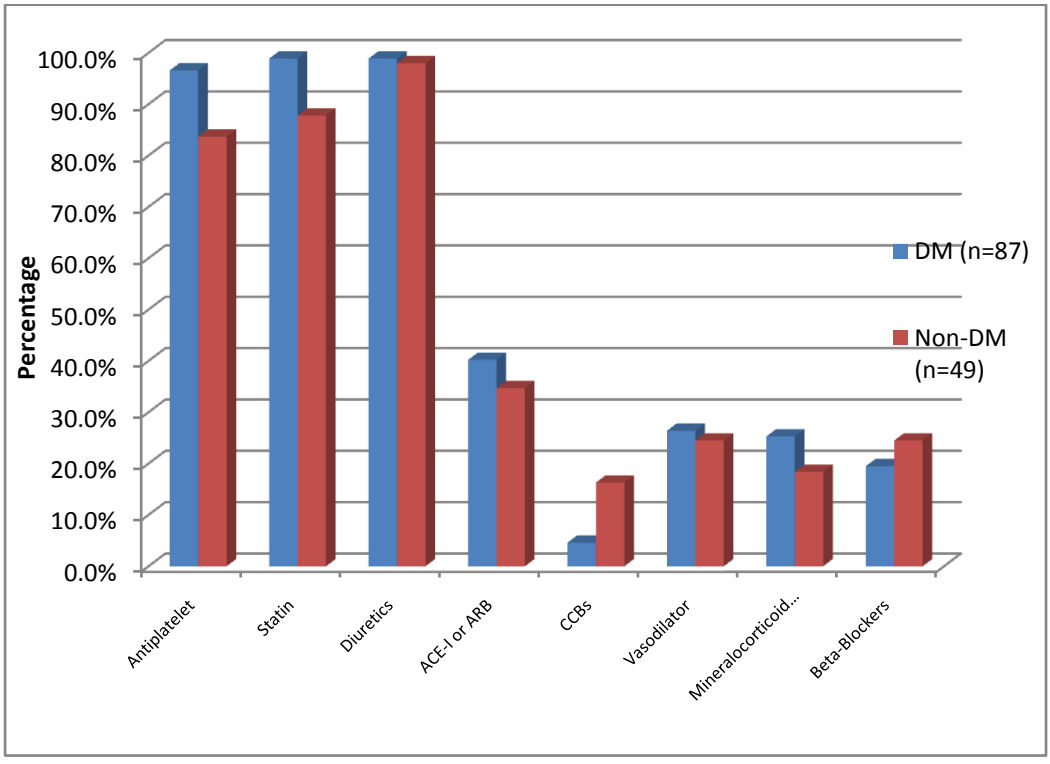


**Figure 19: Treatment given in hospital to patients with acute heart failure**

**TABLE 20. Readmission comparison within 3 months among both groups**

| | | DM (n=87) | | Non-DM (n=49) | | TOTAL | P-VALUE |
|---|---|---|---|---|---|---|---|
| Readmission within 3 months | No | 57 | 65.5% | 41 | 83.7% | 98 | 0.023 |
| | Yes | 30 | 34.5% | 08 | 16.3% | 38 | |

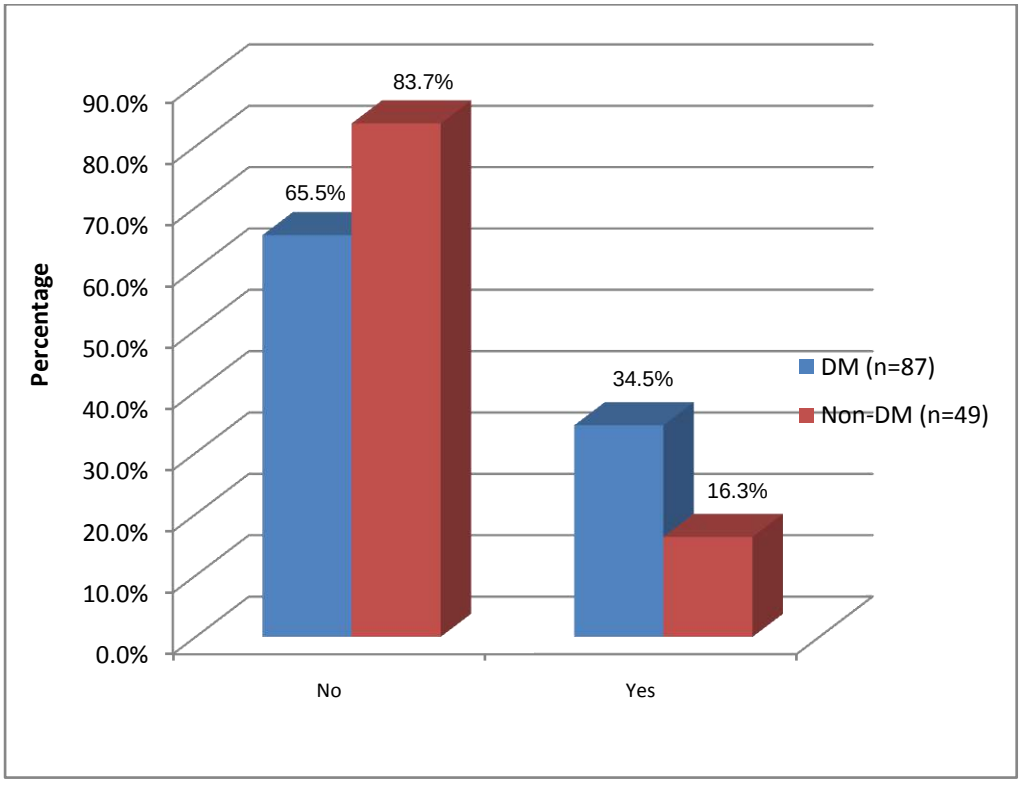


**Figure 20: Readmission comparison within 3 months among both groups**

# DISCUSSION

Heart failure is a progressive disease associated with high morbidity, mortality and its prevalence is rising in the aging population.[60] Diabetes mellitus is a frequent comorbidity of HF that poses an enormous medical, societal and financial burden worldwide, with more than 40% of patients with HF having diabetes mellitus as a discharge diagnosis.[60,61] Hyperglycemia has been associated with changes in cardiac structure, cardiac function, increased atherosclerosis and the existence of a specific diabetic cardiomyopathy phenotype has been suggested.[62] Conversely, HF has been associated with insulin resistance and hyperglycemia in a severity-dependent manner[63]. Despite previous studies establishing the detrimental prognosis of patients with HF and diabetes, the interplay of this bidirectional relationship has not been fully elucidated.

Several studies have demonstrated that diabetes mellitus significantly increases the risk of hospitalization and the duration of hospital stay in HF patients.[61,37] Virtually every HF patient has co-morbidity. There are many other risk factors including hypertension, anemia and thyroid dysfunction which can change the clinical profile and outcome in patients with acute heart failure. Co-morbidities may lead to worsening of HF symptoms, might inhibit optimal HF treatment, might constitute a therapeutic target with possible beneficial effects on HF-related symptoms (e.g. iron deficiency and diabetes mellitus), therapy for HF and co-morbidity leads to polypharmacy and might interact with each other (e.g. beta-blockers for HF and beta-adrenergic agonists for respiratory diseases). Finally, as most of the co-morbidities are exclusion criteria in many trials on HF, less data is available in non-diabetic patients having acute heart failure.

Our study conducted in the department of medicine and other allied specialties, Dayanand Medical College and Hospital, Ludhiana over 9 months, follow up data were collected either by patient visit or using telephone interview at 1 month and 3 months. In this prospective study, the clinical profile, outcome and follow-up status of 136 admitted

patients of acute heart failure with and without type 2 diabetes mellitus were compared. Out of these 136 patients enrolled, 87(64%) patients were diabetic and 49 (36%) patients were non-diabetic.

In our study, it was found that the mean age for patients having acute heart failure with diabetes was 64.84±10.49 years and for non-diabetic patients 67.76±13.29 years. The median age for patients with diabetes was 63 years (58-72 years) and for non-diabetics 70 years (61-76 years). The relatively young age of presentation is seen in diabetics as compared to non-diabetics.

Van Melle JP et al conducted a study 'Heart and Soul Study' in which 839 patients were enrolled in which mean age for patients with diabetes was 65.3±10.3 years and for non-diabetics was 67.4±11.0 years (p value= 0.02)[27] which was in concordance with our study.

Similar findings were found in a study conducted in Denmark by Zareini et al[64] in which patients with new-onset diabetes and prevalent diabetes were slightly younger than patients without diabetes (70, 74, and 77 years respectively; p-value < 0.0001). Study conducted by Michael R. MacDonald et al in Candesartan in Heart Failure: Assessment of Reduction in Mortality and morbidity (CHARM) [37] also found that heart failure presented at a younger age in diabetic patients as compared to non-diabetics.

The potential mechanisms for younger age of presentation in diabetics can be explained by the effects of hyperglycemia which causes up-regulation of sodium absorption by proximal tubules, volume expansion, excess sympathetic and RAAS activation.[65] Hyperglycemia induces advanced glycation end-products which impairs micro vascular function and decreases nitric oxide availability.[66] Insulin resistance in diabetics leads to increased Free Fatty Acid utilization, production of toxic lipid intermediates, increased reactive oxygen species. Increased risk at younger age is also associated with considerably higher body mass index (BMI), worse lipid profile and higher glycemic levels than older patients with diabetes. All of these processes may contribute to changes in cardiac myocytes, endothelial dysfunction, and multi-organ

damage which in turn lead to the early age of presentation in diabetics as compared with non-diabetics.

Diastolic dysfunction develops early in course of diabetes and the degree of glucose deregulation correlates with the severity of Left ventricular dysfunction. Ischemia caused by CAD is an important cause of HFrEF in diabetes. So as supported by many studies, intense glycemic control can be of great benefit in diabetic patients to control cardiovascular outcomes. Risk factor control may need to be more aggressive in younger patients having diabetes as compared with elderly patients.

In our study, among the diabetic group, 55.2 % were females and 44.8% were males. On the other hand among the non-diabetic group, 53.1% were females and 46.9% were males. Although statistically non-significant, the number of females was slightly higher in the diabetic group. Concordant results of female preponderance among diabetic patients were found by Kennel WB et al in the Framingham Heart Study[67], in which diabetes mellitus was associated with a nearly 4-fold greater risk of HF in women and a nearly 2-fold increased risk of HF in men. The population-attributable risk for HF associated with diabetes mellitus was 18% in women and 7.7% in men.

CHARM study[37] reported that among diabetic patients 66.7% were males and 33.3% were females and in the non-diabetic group 69.1% were males and 30.9% were females. Although the number of males were higher in both the groups but number of females were comparatively more in diabetic group as compared to non-diabetic group. Supported by observations of Melchior et al. who conducted a study and found that the male prevalence of heart failure is 55% among diabetics and 66% among non-diabetics.[68] Women with DM comprised a significantly higher proportion i.e. 36% versus 26% among non-diabetic (p value=0.01).

The female preponderance of heart failure can be attributed to high-risk profile in women, less likely to receive preventive treatment or guidance and therapeutic lifestyle changes. Differences in

inflammation, sex hormones and hyperglycemia can also be a cause for more females having acute heart failure as compared to men. Another postulated mechanism for more diastolic dysfunction in females includes an activated renin-angiotensin-aldosterone system in response to low estrogen, which increases reactive oxygen species and, in concert with a drop in nitric oxide with menopause, increases collagen synthesis and diastolic dysfunction.

In our study, duration of hospital stay was significantly longer (11.00±6.29 days) in diabetics as compared to non-diabetics (8.31±5.59 days). Gebreegziabher Y et al conducted a prospective cohort study[69] of the 212 (56% diabetic patients) patients with acute HF and found that HF patients with diabetes had a significantly longer hospital stay compared with the non-diabetic cohort (5.0±0.29 days versus 3.4±0.19 days; p value <0.001).

In a retrospective analysis of a large cohort of patients with HFpEF with and without DM using the GWTG-HF registry (Get With The Guidelines- Heart Failure)[56] diabetes was associated with significantly longer length of stay. Similarly, Bhatia and colleagues conducted a retrospective study and found that poor baseline or in-patient glycemia is correlated with prolonged hospital stay in patients with diabetes admitted with acute heart failure.[70] Longer duration of hospital stay in diabetic patients can be correlated to worse volume overload due to sodium retention and poor diuretic response.

Clinical evaluation should start with a good history which insights into the etiology of heart failure and severity of symptoms. S.Guha et al in the CSI position statement [71] on management of heart failure in India found that the most common symptoms of HF are dyspnea, fluid retention, palpitation and fatigue. Similarly in our study, all patients presenting with acute heart failure had some degree of breathlessness according to NYHA grading. Initially, dyspnea can be exertional, but with time it can worsen to present as orthopnea, Paroxysmal nocturnal dyspnea (PND) or dyspnea at rest (NYHA 4). Diabetic patients presenting with orthopnea were 25.3% while non-diabetic were 20.4%.

PND was present among 14.9% of diabetics and 8.2% of non-diabetics. Diabetic patients were 26.4% who presented with acute heart failure had feet swelling as compared to 12.2% in non-diabetics.

In CHARM study[37] 7599 patients with symptomatic heart failure were studied and concluded that diabetic patients had more signs and symptoms of heart failure and worse NYHA functional status as compared to non-diabetic patients. In this study, orthopnea was present in 64.4% of diabetics and 49.4% of non-diabetics while patients having PND was 53.2% among diabetics and 41.7% among non-diabetics. These observations support our study.

Similar findings were also seen by David Aguilar, MD et al who conducted a Digitalis Investigation Group (DIG) trial[53] and found that patients with diabetes had more signs and symptoms due to fluid overload. Peripheral edema was present in significantly more number of diabetic patients as compared to non-diabetics (69.5% vs 55%; p value= <0.001).

Patients with diabetes have increased neurohumoral activation and alterations in sodium handling, which may predispose to congestion, cardio renal syndrome and decreased diuretic responsiveness.[72] Raised blood glucose levels causes up-regulation of the sodium-glucose cotransporter-2 leading to increased sodium reabsorption and volume overload.

In our study, duration of breathlessness was longer in patients with diabetes (10.90±16.18days) as compared to non-diabetics (5.88±10.58days). Diabetic patients presenting with NYHA grade 2 were 13(14.9%), NYHA grade 3 were 38(43.7%) and NYHA grade 4 were 34(39.1%) while non-diabetic patients presenting with NYHA grade 2 were 14(28.6%), NYHA grade 3 were 19(38.8%) and NYHA grade 4 were 16(32.7%). Most of the patients in diabetic and non-diabetic groups had dyspnea of NYHA grade 3. Compared to non-diabetic, patients with diabetics have worse NYHA functional status.

This difference in observation can be explained by the altered systemic and cardiac glucose metabolism which contributes to the structural and

functional abnormalities of the heart that culminate in cardiac dysfunction. The alteration of cardiac function in diabetics occurs through several different mechanisms, such as decreased glucose transport and carbohydrate oxidation, increase in Free Fatty Acid (FFA) utilization, decrease in sarcolemmal calcium transport and alterations in myofibrillar regulatory contractile proteins. Although the shift of cardiac energy substrate utilization from glucose to FFA oxidation, occurring in the diabetic heart, is essential to ensure continuous adenosine triphosphate (ATP) generation to maintain heart function, this chronically maladaptation leads to decreased energetic reserves and cardiac efficiency. Indeed, diabetic hearts are characterized by a diminished production of high-energy phosphate, since the beta-oxidation of FFA is less efficient than the glycolysis in generating energy (in relation to oxygen consumption) and may increase the risk of cardiac dysfunction during increased metabolic demands or ischemia.

Similar findings were reported in CHARM study[37] and it was observed that in diabetic patients NYHA grade 2 was present in 37.6%, NYHA grade 3 was present in 58.9% of patients, and NYHA grade 4 was present in 3.5% while in non-diabetics NYHA grade 2 was found in 47.9% patients, NYHA grade 3 in 49.9% and NYHA grade 4 in 2.2% patients. Preiss D et al conducted a study Eplerenone in Mild Patients Hospitalization and Survival Study in Heart Failure (EMPHASIS-HF) in which it was found that higher NYHA class is a predictor of incident diabetes among patients with HF[35].

In our study diabetic patients having acute heart failure who were actively consuming alcohol were 25.9% and smokers were 3.5%.On the other hand, 26.4% patients were alcoholic and 13.2%were smokers among non-diabetic group.

Similar findings related to smoking were found in the CHARM study [37] in which smokers among diabetics was less than (12.2%) as compared to non-diabetics (15.6%). Smoking can damage function of heart by increasing risk of atherosclerosis. This leads to limitation of blood flow

to all organs including heart which leads to ischemic heart disease. Diabetics are more likely to have an ischemic etiology of heart failure and less likely to have idiopathic dilated cardiomyopathy. So quitting smoking will reduce risk of developing and dying from heart diseases.

Fluid retention in patients with acute heart failure commonly manifests as pedal edema, ascites, and pleural effusion. In present study the most common physical sign was pedal edema which was found in 42.5% of diabetic patients and 30.6% of non-diabetic patients followed by raised jugular venous pressure (JVP) which was seen in 26.4% of diabetics and 18.4% of non-diabetics. JVP is extremely important to know about systemic venous congestion. These observations were supported by the CHARM study[37] in which pedal edema among 67.8% of diabetics and 54.8% of non-diabetics while JVP was raised in 35.4% of patients with diabetes and among 27.8% patients without diabetes.

In the DIG trial[53] pedal edema was found in 69.5% of patients with diabetes and 55.0% of non-diabetics which was statistically more in diabetic patients (p value= <0.001). In this trial, JVP was raised in 50.5% of diabetics and among 46.3% of patients without diabetes. Anemia is a well-known precipitating risk factor for HF. Diabetic patients having pallor were more 9.2% as compared to non-diabetics 6.1%. This might be due to the presence of anemia of a chronic disorder in diabetic patients.

On respiratory system examination in our study group, pulmonary rales due to pulmonary venous congestion were present significantly in more number of diabetics as compared to non-diabetics(71.3% vs 63.1%; p value=0.033). Supported by observations made in the CHARM study[37] where 67.6%of patients had pulmonary rales among the diabetic group and 59.8% patients among non-diabetics. Compared to the non-diabetic group, diabetic patients had more signs and symptoms of heart failure. The probable mechanism for pulmonary rales in diabetic patients can be increase in sodium reabsorption by kidneys which in turn leads to volume overload. Diabetic patients also have poor response to diuretics leading to signs of fluid overload. Similar findings

were found by DIG trial[53] and found that although non-significant but patients with diabetics who were having pulmonary rales (74.7%) were slightly more as compared to non-diabetics (73.2%).

Gastrointestinal symptoms can be anorexia, early satiety, which can be attributed to venous congestion. Hepatomegaly was present in 9.2% of diabetics and 4.1% of non-diabetics in our study. Hepatomegaly is due to venous congestion and can be used to monitor the patients serially.

BMI (Body Mass Index) was observed to be more among the diabetic as compared to non-diabetic subjects used for this study. There was a significant difference in BMI between diabetic and non-diabetic patients in our study. Diabetic patients contain statistically more number of obese and overweight individuals as compared to non-diabetics overweight and obese (43.7%, 14.9% vs. 30.6%, 0.0% respectively; p value= 0.001). Lifestyle management should be integral in the care of patients with DM and HF. DM is linked to obesity, inactivity and poor dietary choices, which in turn are linked to cardiovascular diseases including HF. The Association of obesity with diabetes and diabetes with heart failure is well known. A significantly higher incidence of obesity in diabetics is found consistently in many studies.

Supported by I-PRESERVE trial (Irbesartan in Heart Failure With Preserved Ejection Fraction) trial conducted Kristensen SL et al [46] in which compared to those without diabetes mellitus, higher body mass index(31 versus 29 kg/$m^2$, p value <0.01) was found. In the DIG trial conducted by David Aguilar, MD et al[53] BMI was found is significantly more in diabetic patients (30.8±7.3 kg/$m^2$) as compared to non-diabetics (27.7±5.5 kg/$m^2$).

Similar observations made in 'Heart and Soul Study'[27] in which the BMI of diabetic patients was more than non-diabetics (29.9±6.0, 27.9±4.7; p value= <0.001) while in the CHARM programme[37] number of underweight, normal, overweight and obese were (0.6%, 18.8%, 37.5%, 42.7%) among diabetic patients and (1.3%, 30.2%, 41.2%, 26.9% respectively) among the non-diabetic group.

Laboratory investigation data of our study revealed the presence of

significantly low hemoglobin (10.37±2.10 g/dl) in diabetic patients in comparison to non-diabetic patients (11.74±2.42 g/dl). Observations made in the CHARM study[37] also showed similar results that diabetic patients had low hemoglobin (13.3±1.7g/dl) as compared to non-diabetics (13.8±1.6 g/dl). Non-diabetic patients had significantly high TLC (12.83±6.26 x $10^3$/$mm^3$) in contrast to non-diabetic (10.87±5.00 x $10^3$/$mm^3$) which can be explained as sepsis can be etiology of global hypokinesia and thus heart failure in non-diabetic patients. Erythrocyte sedimentation rate (ESR) was significantly higher (43.48±30.09) in comparison to non-diabetic (32.37±22.06). As patients having creatinine >2mg/dl were in inclusion criteria for our study, creatinine levels were slightly higher (1.19±0.39 mg/dl) among diabetics and (1.14±0.40 mg/dl) among non-diabetics.

Levels of BNP were almost similar among diabetic (1403.56pg/ml) and non-diabetic (1117.45pg/ml) patients in our study. NT-proBNP is a split product of BNP which is elevated in LV dysfunction. Similarly in the RELAX trial[54] (Phosphodiesterase-5Inhibition to Improve Clinical Status and Exercise Capacity in Heart Failure with Preserved Ejection Fraction) patients with diabetes had similar levels of NT-proBNP (713) compared with those without diabetes (648).

In I-PRESERVE trial[46] it was concluded that diabetics presenting with heart failure had higher levels of N terminal pro–B-type natriuretic peptide (NT-proBNP) as compared to non-diabetics(403 versus 320 pg/mL; p value <0.01).On the contrary, in a retrospective analysis of a large cohort of patients with HFpEF with and without DM using the GWTG-HF registry[56] patients with DM had higher systolic blood pressure, weight and BMI on admission and discharge, but lower B-type natriuretic peptide (BNP) levels compared with those without DM. Cardiac ventricles release B-type natriuretic peptide (BNP) in response to volume expansion and pressure overload therefore, BNP concentration may be used as a biochemical marker of cardiac failure. Raised BNP and NT-proBNP occurs due to increased LV wall tension, reduced oxygen supply and heart failure. As levels of NT-proBNP can

be high even in asymptomatic LV dysfunction so NT-proBNP can also serve as a screening investigation to select patients with type 2 diabetes who could benefit from an echocardiography.

Diabetic patients had a slightly low mean ejection fraction of 37.25±13.81% as compared to non-diabetics 41.24±15.25%. Our findings were supported by the CHARM study[37] and found a mean EF of 38.6% in diabetic patients and 39% in non-diabetic patients. Probably, diabetics had low ejection fraction as compared to non-diabetics due to more prevalence of CAD among diabetics. Detailed echocardiography of diabetic and non-diabetic patients showed no significant difference in end-systolic and end-diastolic dimensions, left ventricular mass, left the atrial area and left ventricular systolic function.

In DIG trial[53] found that diabetic patients had mean EF (55.1±7.9%) and non-diabetic had mean EF (55.6±8.2%). In I-PRESERVE trial conducted by Kristensen SL et al[46], found that patients with diabetes had larger end-systolic and end-diastolic dimensions but no significant differences in LV systolic function. Brian RL et al followed 216 patients (diabetic=93 and non-diabetic= 123) with LVEF ≥50% for 6 months in a RELAX trial [54] and concluded that patients had no differences in systolic and diastolic function, LV volume or wall thickness was observed.

In our study prevalence of CAD was significantly more in diabetics as compared to non-diabetics (59.8% vs 36.7%; p value= 0.010). Thus, significantly more number of diabetics had ischemic heart disease as a cause of heart failure. Similar findings were seen by a Digitalis Investigation Group (DIG) trial[53] it was found that among diabetic patients (64.6%) and among non-diabetics (53.1%)had ischemic heart failure (p value= <0.001).

Among patients without CAD, diabetic group had 42.9% patients with HFrEF, 5.7% patients with HFmrEF and 51.4% patients with HFnEF in contrast to non-diabetics in which 45.2% patients had HFrEF, 3.2%

patients had HFmrEF and 51.6% patients had HFnEF. The CHARM study[37] found that the prevalence of diabetes was 28.3% in patients with HFpEF and 28.5% in patients with HFrEF but in this study, the HFpEF fraction included those patients who had EF >40%. Jun Gu et al conducted a study[73] and observed that out of 902 patients enrolled, 32.2% had HFnEF, 14.5% had HFmrEF and 53.3% had HFrEF.

In our study, there was no statistically significant difference in discharge against medical advice (DAMA), discharges and deaths percentage among both the groups. One (1.1%) diabetic patient and two (4.1%) non-diabetic went DAMA. Diabetes was associated with a slightly increased risk of mortality. Four (4.6%) diabetic patients died during the hospital stay and two (4.1%) non-diabetic patients died. Six (6.9%) diabetic patients died at 1 month and ten (11.5%) diabetic patients died at 3 months. On the other hand, non-diabetic patients who died at 1 month were three (6.1%) and five (10.2%) patients died at 3 months.

In population-based studies, concomitant DM increases the risk of death in both hospitalized and ambulatory patients with HF[74]. Multivariable HF risk models like MAGGIC [Meta-analysis Global Group in Chronic Heart Failure] risk score[43] frequently highlight DM as an independent risk factor for death. The risk of hospitalization is up to 50% higher in patients with DM than in those without DM.[75]

In the CHARM study[37], DM was associated with a greater relative risk of cardiovascular death or heart failure hospitalization in patients with HFpEF (HR 2.0) than in those with HFrEF (HR 1.6). Statistically, a significant interaction was seen between diabetes and EF concerning this outcome. But for all-cause mortality, the risk conferred by diabetes was similar in both HFpEF and HFrEF. Kristensen SL et al observed in the I-PRESERVE trial[46], over a median follow-up of 4.1 years, cardiovascular death or HF hospitalization occurred in 34% of patients with DM and HFpEF versus 22% of HFpEF patients without DM (adjusted HR, 1.75) and all-cause mortality was 28% and 19%, respectively (adjusted HR, 1.59).

In a retrospective analysis of a large cohort of patients with HFpEF with and without DM using the GWTG-HF registry[56] patients with DM had a lower rate of in-hospital mortality as compared to those without DM (2.1% versus 2.8%; p value= 0.13). Patients with DM had lower mortality at 1 month than those without DM (4.8% versus 6.2%) but in the adjusted analysis, DM was not independently associated with 30-day mortality.

In our study at 1 month, among diabetics, 24.1% patients had NYHA grade 1, 63.2% patients had NYHA grade 2 and 5.7% patients had NYHA grade 3. While at 3 months, 19.5% of patients had NYHA grade 1, 49.4% had NYHA grade 2, 17.2% patients had NYHA grade 3 and 2.3% patients experienced NYHA grade 4 of dyspnea. Compared with diabetic patients, among non-diabetics, 24.5% patients had NYHA grade 1, 57.1% patients had NYHA grade 2 and 8.2% patients had NYHA grade 3 at 1 month. While at 3 months, non-diabetic patients having NYHA grade 1 was 32.7%, NYHA grade 2 was 42.9%, NYHA grade 3 was 8.2% and NYHA grade 4 was 2.0%. Symptoms were more severe in diabetic patients as compared to non-diabetic patients but this difference was not statistically significant. Patients with diabetes and heart failure have a worse health-related quality of life than patients with heart failure alone.

Antiplatelet therapy was administered significantly more often to diabetic patients (96.6%) as compared to non-diabetics (83.7%) in our study group. Statins were given to significantly more number of diabetic patients (98.9%) as compared to non-diabetics (87.8%). Diuretics were frequently prescribed to both diabetics and non-diabetics. More of the diabetic patients (40.2%) received ACE-I or ARBs in contrast to non-diabetics (34.7%). A meta-analysis[76]of 6 angiotensin-converting enzyme (ACE) inhibitor trials demonstrated reduction in morbidity and mortality in patients with HF with or without DM. The pooled analysis of 2398 patients found a relative risk for death of 0.84 (95% CI, 0.70–1.00) in patients with DM versus 0.85 (95% CI, 0.78–0.92) in those without DM.

The absolute reduction in mortality with ACE inhibitors in individuals with DM is substantial because of their baseline higher mortality risk. Similar results were seen in pivotal HF trials of angiotensin receptor blockers (ARBs), including the CHARM study.[37] Jun Gu et al[73] conducted a study in diabetic patients with HF in which 902 patients were enrolled in which 80.3% of patients received ACE-I or ARBs and 75.7% received beta-blockers.

In our study non-diabetic patients (16.3%) were receiving more CCBs as compared to diabetics (4.6%). Vasodilators, mineralocorticoid antagonist and beta-blockers were given more commonly to diabetic patients (26.4%, 25.3% and 19.5%) in comparison to non-diabetics (24.5%, 18.4% and 24.5%). Most meta-analyses of β-blocker trials by DM status have demonstrated a consistent benefit in individuals with DM and HFrEF[76,77], although one suggested a comparatively greater benefit in individuals without DM[78]. The latter meta-analysis of 6 pivotal β-blocker studies, including 3230 patients with DM (25% of the cohort), showed that β-blockers significantly reduce mortality in individuals with (relative risk, 0.84 [95% CI, 0.73–0.91]) and without (relative risk, 0.72 [95% CI, 0.65–0.79]) DM[78], although the magnitude of the reduction was greater in patients without DM (P=0.023).

Readmission in patients with diabetes was significantly more as compared to non-diabetics in our study (34.5% vs 16.3%; p value=0.023). Arora S. et al conducted a study and found that hospital readmission is modestly increased in patients with DM.[79] In a retrospective analysis using the GWTG-HF registry[56] diabetes was associated with significantly increased readmission.

The association between diabetes and HF has been well established and reproduced in several observational cohorts. Diabetes is associated with an up to four times increased risk of HF when compared to a general population without diabetes.[80] It is not clear whether this is due to shared risk factors for the two conditions or the presence of specific diabetic cardiomyopathy, where pathophysiological mechanisms related to abnormal cardiac handling

of glucose has been suggested to lead to both systolic and diastolic dysfunction[81,82]. The high incidence of HF in patients with diabetes, even when coronary artery disease is absent, suggests a substantial direct relation between diabetes and the development of HF.[82] Diabetics had a relatively younger age at presentation, more number of females, had higher BMI index or obesity, longer duration of hospital stay with worse functional status and have more readmission rates as compared with non-diabetics.

# SUMMARY AND CONCLUSION

Throughout the world, Heart failure has been singled out as an emerging epidemic especially in elderly individuals. Heart failure is one of the major cardiovascular complications in patients with diabetes mellitus type 2 (DM type 2) and it increases the risk of morbidity and mortality. The coexistence of heart failure and type 2 diabetes mellitus is common and has a strong impact on clinical management and prognosis. About 45% of patients with HFpEF have diabetes. The prevalence of diabetes is increasing in patients with new-onset HFpEF.

- The mean age for patients with diabetes was 64.84±10.49 years and for non-diabetic patients were 67.76 ±13.29 years. The median age for patients with diabetes was 63 years (58-72 years) and for non-diabetics was 70 years (61-76 years).
- Among diabetic patients, 48 (55.2%) were females and 39 (44.8%) were males. Among non-diabetic patients, 26 (53.1%) were females and 23 (46.9%) were males.
- In diabetic patients duration of hospital stay was significantly longer (11.00±6.29) days as compared to non-diabetics (8.31±5.59) (p value=0.014).
- There was no significant difference in presenting complaints.
- Diabetic patients had more signs and symptoms of heart failure and worse NYHA functional status as compared to non-diabetic patients.
- Pulmonary rales due to pulmonary venous congestion were present significantly in sixty two diabetics and twenty six non-diabetics (71.3% vs 63.1%; p value=0.033).
- Smokers among diabetic patients were significantly more as compared to smokers among patients without diabetes.
- Diabetic patients contain statistically more number of obese and overweight individuals as compared to non-diabetics overweight and obese (43.7%,14.9% vs. 30.6%, 0.0% respectively; p value= 0.001).

- Diabetic patients were anemic as compared to non-diabetics. Significantly low hemoglobin (10.37±2.10 g/dl) in diabetic patients in comparison to non-diabetic patients (11.74±2.42 g/dl).
- BNP is a marker of LV dysfunction. Levels of BNP were almost similar among diabetic (1403.56 pg/ml) and non-diabetic (1117.45 pg/ml) patients in our study.
- Diabetic patients had a slightly low mean ejection fraction of 37.25±13.81% as compared to non-diabetics 41.24±15.25%.
- Detailed Echocardiography of diabetic and non-diabetic patients showed no significant difference in end-systolic and end-diastolic dimensions, left ventricular mass and left the atrial area.
- CAD was found to be significantly more in diabetic patients as compared to non-diabetic patients (59.8% vs 36.7%; p value= 0.010).
- Among patients without CAD, diabetic group had 42.9% patients with HFrEF, 5.7% patients with HFmrEF and 51.4% patients with HFnEF in contrast to non-diabetics in which 45.2% patients had HFrEF, 3.2% patients had HFmrEF and 51.6% patients had HFnEF
- There was no statistically significant difference in discharge against medical advice (DAMA), discharges and deaths percentage among both the groups.
- At 1 month, among diabetics, 24.1% patients had NYHA grade 1, 63.2% patients had NYHA grade 2 and 5.7% patients had NYHA grade 3. Compared with diabetic patients, among non-diabetics, 24.5% patients had NYHA grade 1, 57.1% patients had NYHA grade 2 and 8.2% patients had NYHA grade 3 at 1 month.
- While at 3 months, among diabetics, 19.5% of patients had NYHA grade 1, 49.4% had NYHA grade 2, 17.2% patients had

NYHA grade 3 and 2.3% patients experienced NYHA grade 4 of dyspnea. Among non-diabetics, patients having NYHA grade 1 was 32.7%, NYHA grade 2 was 42.9%, NYHA grade 3 was 8.2% and NYHA grade 4 was 2.0%.

- Patients with diabetes and heart failure had worse health-related quality of life than patients with heart failure alone.
- Antiplatelet therapy was administered significantly more often to Diabetic patients 96.6 % as compared to non-diabetics 83.7% in our study group; (p value=0.024).
- Statistically significant data was also found in the comparison of statins which were given more commonly to diabetic patients 98.9% as compared to non-diabetics 87.8%; (p value=0.005).
- Readmission in patients with diabetes was significantly more as compared to non-diabetics in our study (34.5% vs16.3%; p value=0.023).

# BIBLIOGRAPHY


1. Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, Das SR, Deo R, et al. American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart Disease and Stroke Statistics-2017 Update: A Report From the American Heart Association. Circulation. 2017;135:e146-e603.
2. Fang ZY, Yuda S, Anderson V, Short L, Case C, Marwick TH. Echocardiographic detection of early diabetic myocardial disease. J Am CollCardiol. 2003;41:611-7.
3. Ponikowski P, Voors AA, Anker SD, Bueno H, Cleland JGF, Coats AJS, et.al. Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. Eur Heart J. 2016;37:2129-200.
4. Global Burden of Disease Study 2015. Global burden of disease study 2015 (GBD 2015) results. Seattle: Institute for Health Metrics and Evaluation (IHME), University of Washington; 2016. Available from: http://ghdx.healthdata.org/gbd-results-tool. Accessed 9 Aug 2020
5. National Center for Health Statistics. Mortality multiple cause micro-data files, 2015: public-use data file and documentation: NHLBI tabulations. Available from: https://www.cdc.gov/nchs/nvss/mortality_public_use_data.htm. Accessed 9 Aug 2020.
6. Mayer-Davis EJ, Lawrence JM, Dabelea D, Divers J, Isom S, Dolan L. Incidence trends of type 1 and type 2 diabetes among youths. 2002-2012. N Engl J Med. 2017;376:1419-29.
7. Rodgers A, Ezzati M, Vander Hoorn S, Lopez AD, Lin RB, Murray CJ. Comparative risk assessment collaborating group distribution of major health risks: Findings from the global burden of disease study. PLoS Med. 2004;1:e27.

8. Huffman MD, Prabhakaran D. Heart failure: epidemiology and prevention in India. Natl Med J India. 2010;23:283-8.
9. Elley CR, Kenealy T, Robinson E, Drury PL. Glycated haemoglobin and cardiovascular outcomes in people with Type 2 diabetes: a large prospective cohort study. Diabet Med. 2008;25:1295-301.
10. International Diabetes Federation. Diabetes Atlas; 2006. Available at: http://www.eaqtlas.idf.org/Prevalence/All_diabetes. Accessed 20 Dec 2020.
11. Chen HF, Ho CA, Li CY. Risk of heart failure in a population with type 2 diabetes versus a population without diabetes with and without coronary heart disease. Diabetes Obes Metab. 2019;21:112-9.
12. Benjamin EJ, Virani SS, Callaway CW, Chamberlain AM, Chang AR, Cheng S, et al. American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. Heart Disease and Stroke Statistics-2018 Update: A Report From the American Heart Association. Circulation. 2018;137:e67-e492.
13. Echouffo-Tcheugui JB, Xu H, DeVore AD, Schulte PJ, Butler J, Yancy CW, et al. Temporal trends and factors associated with diabetes mellitus among patients hospitalized with heart failure: Findings from Get With The Guidelines-Heart Failure registry. Am Heart J. 2016;182:9-20.
14. Cheng RK, Cox M, Neely ML, Heidenreich PA, Bhatt DL, Eapen ZJ, et al. Outcomes in patients with heart failure with preserved, borderline, and reduced ejection fraction in the Medicare population. Am Heart J. 2014;168:721-30.
15. Seferovic PM, Petrie MC, Filippatos GS. Type 2 diabetes mellitus and heart failure: a position statement from the Heart Failure Association of the European Society of Cardiology. Eur J Heart Fail. 2018;20:853–72.
16. Liu JE, Palmieri V, Roman MJ. The impact of diabetes on left

ventricular filling pattern in normotensive and hypertensive adults: the strong heart study. J Am Coll Cardiol. 2001;37:1943–9.

17. Aguilar D, Deswal A, Ramasubbu K. Comparison of patients with heart failure and preserved left ventricular ejection fraction among those with versus without diabetes mellitus. Am J Cardiol. 2010;105:373–7.
18. Skali H, Shah A, Gupta DK. Cardiac structure and function across the glycemic spectrum in elderly men and women free of prevalent heart disease: the atherosclerosis risk in the community study. Circ Heart Fail. 2015;8:448–54.
19. Rubler S, Dlugash J, Yuceoglu YZ, Kumral T, Branwood AW, Grishman A. New type of cardiomyopathy associated with diabetic glomerulosclerosis. Am J Cardiol. 1972;30:595-602.
20. Ernande L, Derumeaux G. Diabetic cardiomyopathy: myth or reality? Arch Cardiovasc Dis. 2012;105:218-25.
21. Bleumink GS, Knetsch AM, Sturkenboom MC. Quantifying the heart failure epidemic: prevalence, incidence rate, lifetime risk and prognosis of heart failure The Rotterdam Study. Eur. Heart J England. 2004;25:1614-9.
22. Yancy CW, Jessup M, Bozkurt B. ACCF/AHA Guideline for the Management of Heart Failure: executive summary: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation. 2013;128:1810-52.
23. Shindler DM, Kostis JB, Yusuf S, Quinones MA, Pitt B, Stewart D, et al. Diabetes mellitus, a predictor of morbidity and mortality in the Studies of Left Ventricular Dysfunction (SOLVD) trials and registry. Am J Cardiol. 1996;77:1017–20.
24. Greenberg BH, Abraham WT, Albert NM, Chiswell K, Clare R, Stough WG, et al. Influence of diabetes on characteristics and outcomes in patients hospitalized with heart failure: a report from the Organized Program to Initiate Lifesaving Treatment in

Hospitalized Patients with Heart Failure (OPTIMIZE-HF). Am Heart J. 2007;154:277.e1-8.

25. Boonman-de Winter LJ, Rutten FH, Cramer MJ, Landman MJ, Liem AH, et al. High prevalence of previously unknown heart failure and left ventricular dysfunction in patients with type 2 diabetes. Diabetologia. 2012;55:2154-62.
26. Kannel WB, McGee DL. Diabetes and cardiovascular disease: the Framingham study. JAMA. 1979;241:2035–8.
27. Van Melle JP, Bot M, de Jonge P, de Boer RA, van Veldhuisen DJ, Whooley MA. Diabetes, glycemic control, and new-onset heart failure in patients with stable coronary artery disease: data from the Heart and Soul Study. Diabetes Care. 2010;33:2084–9.
28. Bertoni AG, Hundley WG, Massing MW, Bonds DE, Burke GL, Goff DC Jr. Heart failure prevalence, incidence, and mortality in the elderly with diabetes. Diabetes Care. 2004;27:699–703.
29. Bibbins-Domingo K, Lin F, VittinghoffE, Barrett-Connor E, Hulley SB, Grady D et al. Predictors of heart failure among women with coronary disease. Circulation. 2004;110:1424–30.
30. Held C, Gerstein HC, Yusuf S, Zhao F, Hilbrich L, et al.; ONTARGET/TRANSCEND Investigators. Glucose levels predict hospitalization for congestive heart failure in patients at high cardiovascular risk. Circulation. 2007;115:1371-5.
31. Matsushita K, Blecker S, Pazin-Filho A, Bertoni A, Chang PP, et al. The association of hemoglobin A1c with incident heart failure among people without diabetes: the Atherosclerosis Risk in Communities study. Diabetes. 2010;59:2020-6.
32. Arnlöv J, Lind L, Zethelius B, Andrén B, Hales CN, et al. Several factors associated with the insulin resistance syndrome are predictors of left ventricular systolic dysfunction in a male population after 20 years of follow-up. Am Heart J. 2001;142:720–4.
33. Arnlöv J, Lind L, Sundström J, Andrén B, Vessby B, Lithell H. Insulin resistance, dietary fat intake and blood pressure predict

left ventricular diastolic function 20 years later. Nutr Metab Cardiovasc Dis. 2005;15:242–9.

34. Preiss D, Zetterstrand S, McMurray JJ, Ostergren J, Michelson EL, et al. Candesartan in Heart Failure Assessment of Reduction in Mortality and Morbidity Investigators. Predictors of development of diabetes in patients with chronic heart failure in the Candesartan in Heart Failure Assessment of Reduction in Mortality and Morbidity (CHARM) program. Diabetes Care. 2009;32:915–20.
35. Preiss D, van Veldhuisen DJ, Sattar N, Krum H, Swedberg K, Shi H, et al. Eplerenone and new-onset diabetes in patients with mild heart failure: results from the Eplerenone in Mild Patients Hospitalization and Survival Study in Heart Failure (EMPHASIS-HF). Eur J Heart Fail. 2012;14:909–15.
36. Centers for Disease Control and Prevention. Incidence of Diagnosed Diabetes. https://www.cdc.gov/diabetes/data/statistics-report/incidencediabetes.html. Accessed Nov 20, 2020.
37. MacDonald MR, Petrie MC, Varyani F, Ostergren J, Michelson EL, Young JB, et al. CHARM Investigators. Impact of diabetes on outcomes in patients with low and preserved ejection fraction heart failure: an analysis of the Candesartan in Heart failure: Assessment of Reduction in Mortality and morbidity (CHARM) programme. Eur Heart J. 2008;29:1377-85.
38. MacDonald MR, Petrie MC, Hawkins NM, Petrie JR, Fisher M, McKelvie R, et al. Diabetes, left ventricular systolic dysfunction, and chronic heart failure. Eur Heart J. 2008;29:1224-40.
39. Seferović PM, Paulus WJ. Clinical diabetic cardiomyopathy: a two-faced disease with restrictive and dilated phenotypes. Eur Heart J. 2015;36:1718-27.
40. Seferović PM, Petrie MC, Filippatos GS, Anker SD, Rosano G, Bauersachs J, et al. Type 2 diabetes mellitus and heart failure: a position statement from the Heart Failure Association of the

European Society of Cardiology. Eur J Heart Fail. 2018;20:853-72.

41. Nichols GA, Hillier TA, Erbey JR, Brown JB. Congestive heart failure in type 2 diabetes: prevalence, incidence, and risk factors. Diabetes Care. 2001;24:1614-9.
42. Dauriz M, Targher G, Laroche C, Temporelli PL, Ferrari R, Anker S, et al. ESC-HFA Heart Failure Long-Term Registry. Association Between Diabetes and 1-Year Adverse Clinical Outcomes in a Multinational Cohort of Ambulatory Patients With Chronic Heart Failure: Results From the ESC-HFA Heart Failure Long-Term Registry. Diabetes Care. 2017;40:671-8.
43. Pocock SJ, Ariti CA, McMurray JJ, Maggioni A, Køber L, Squire IB, et al. Predicting survival in heart failure: a risk score based on 39 372 patients from 30 studies. Eur Heart J. 2013;34:1404–13.
44. Allen LA, Magid DJ, Gurwitz JH, Smith DH, Goldberg RJ, et al. Risk factors for adverse outcomes by left ventricular ejection fraction in a contemporary heart failure population. Circ Heart Fail. 2013;6:635–46.
45. MacDonald MR, Petrie MC, Varyani F, Ostergren J, Michelson EL, Young JB, et al. Impact of diabetes on outcomes in patients with low and preserved ejection fraction heart failure: an analysis of the Candesartan in Heart failure: Assessment of Reduction in Mortality and morbidity (CHARM) programme. Eur Heart J. 2008;29:1377–85.
46. KristensenSL, Mogensen UM, Jhund PS, Petrie MC, Preiss D, Win S, et al. Clinical and echocardiographic characteristics and cardiovascular outcomes according to diabetes status in patients with heart failure and preserved ejection fraction: a report from the I-PRESERVE Trial (Irbesartan in Heart Failure With Preserved Ejection Fraction). Circulation. 2017;135:724–35.
47. Patel A, MacMahon S, Chalmers J, Neal B, Billot L, Woodward

M, et al. ADVANCE Collaborative Group. Intensive blood glucose control and vascular outcomes in patients with type 2 diabetes. N Engl J Med. 2008;358:2560-72.

48. Cheng RK, Cox M, Neely ML. Outcomes in patients with heart failure with preserved, borderline, and reduced ejection fraction in the Medicare population. Am Heart J 2014;168:721–30.
49. Solomon SD, Rizkala AR, Lefkowitz MP. Baseline characteristics of patients with heart failure and preserved ejection fraction in the PARAGON-HF trial. Circ Heart Fail 2018;11:e004962.
50. Chen YY, Chen Y, Liang SM, Su ZZ, Shu XR, Zhang HF, et al. Prognostic Impact of Fasting Plasma Glucose on Mortality and Re-Hospitalization in Patients with Acute Heart Failure. Chin Med J (Engl). 2018 ;131:2032-40.
51. Bahrami H, Bluemke DA, Kronmal R. Novel metabolic risk factors for incident heart failure and their relationship with obesity: the MESA (Multi-Ethnic Study of Atherosclerosis) study. J Am Coll Cardiol. 2008;51:1775-83.
52. Lund LH, Claggett B, Liu J. Heart failure with mid-range ejection fraction in CHARM: characteristics, outcomes and effect of candesartan across the entire ejection fraction spectrum. Eur J Heart Fail 2018;20:1230–9.
53. Aguilar D, Deswal A, Ramasubbu K, Mann DL, Bozkurt B. Comparison of patients with heart failure and preserved left ventricular ejection fraction among those with versus without diabetes mellitus. Am J Cardiol 2010;105:373–7.
54. Lindman BR, Davila-Roman VG, Mann DL, et al. Cardiovascular phenotype in HFpEF patients with or without diabetes: a RELAX trial ancillary study. J Am CollCardiol 2014;64:541–9.
55. Gustafsson I, Brendorp B, Seibaek M. Influence of diabetes and diabetes-gender interaction on the risk of death in patients hospitalized with congestive heart failure. J Am CollCardiol. 2007;43:771-7.

56. Smaha LA, American Heart Association. The American Heart Association Get with The Guidelines program. Am Heart J. 2004;148:S46–8.
57. Nichols GA, Gullion CM, Koro CE, Ephross SA, Brown JB. The incidence of congestive heart failure in type 2 diabetes: an update. Diabetes Care. 2004;27:1879-4.
58. Aronow WS, Ahn C. Incidence of heart failure in 2,737 older persons with and without diabetes mellitus. Chest. 1999;115:867-8.
59. Shah AD, Langenberg C, Rapsomaniki E, Denaxas S, Pujades-Rodriguez M, Gale CP, et al. Type 2 diabetes and incidence of cardiovascular diseases: a cohort study in 1.9 million people. Lancet Diabetes Endocrinol. 2015;3:105–13.
60. Ponikowski P, Voors AA, Anker SD, Bueno H, Cleland JG, Coats AJ, et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: the Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC). Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. Eur J Heart Fail. 2016;18:891–975.
61. Rosano GM, Vitale C, Seferovic P. Heart failure in patients with diabetes mellitus. Cardiac Failure Rev. 2017;3:52–5.
62. Skali H, Shah A, Gupta DK, Cheng S, Claggett B, Liu J, et al. Cardiac structure and function across the glycemic spectrum in elderly men and women free of prevalent heart disease: the atherosclerosis risk in the community study. Circulation. 2015;8:448–54.
63. Demant MN, Gislason GH, Køber L, Vaag A, Torp‐Pedersen C, Anders‐ son C. Association of heart failure severity with risk of diabetes: a Danish nationwide cohort study. Diabetologia. 2014;57:1595–600.
64. Zareini B, Rørth R, Holt A, Mogensen UM, Selmer C, Gislason G, et al. Heart failure and the prognostic impact and incidence of

new-onset of diabetes mellitus: a nationwide cohort study. CardiovascDiabetol. 2019 Jun 12;18:79.

65. Thorp AA, Schlaich MP. Relevance of sympathetic nervous system activation in obesity and metabolic syndrome. J Diabetes Res 2015;2015:341583.
66. Dei Cas A, Khan SS, Butler J, et al. Impact of diabetes on epidemiology, treatment and outcomes of patients with heart failure. J Am CollCardiol HF. 2015;3:136–45
67. Kannel WB, McGee DL. Diabetes and cardiovascular disease: the Framingham study. JAMA. 1979;241:2035-8.
68. Melchior T, Rask-Madsen C, Torp-Pedersen C, Hildebrandt P, Kober L, Jensen G. The impact of heart failure on prognosis of diabetic and non-diabetic patients with myocardial infarction: a 15-year follow-up study. Eur J Heart Fail. 2001;3:83-90.
69. Gebreegziabher Y, McCullough PA, Bubb C, Loney-Hutchinson L, Makaryus JN, Anand N, et al. Admission hyperglycemia and length of hospital stay in patients with diabetes and heart failure: a prospective cohort study. Congest Heart Fail. 2008 ;14:117-20.
70. Bhatia V, Wilding GE, Dhindsa G. Association of poor glycemic control with prolonged hospital stay in patients with diabetes admitted with exacerbation of congestive heart failure. EndocrPract. 2004;10:467–71.
71. Guha S, Harikrishnan S, Ray S, Sethi R, Ramakrishnan S, Banerjee S, et al. CSI position statement on management of heart failure in India. Indian Heart J. 2018;70:S1-72.
72. Heerspink HJ, Perkins BA, Fitchett DH, Husain M, Cherney DZ. Sodium glucose cotransporter 2 inhibitors in the treatment of diabetes mellitus: cardiovascular and kidney effects, potential mechanisms, and clinical applications. Circulation 2016;134:752–72.
73. Gu J, Pan JA, Fan YQ, Zhang HL, Zhang JF, Wang CQ. Prognostic impact of HbA1c variability on long-term outcomes in

patients with heart failure and type 2 diabetes mellitus. Cardiovasc Diabetol. 2018;17:96.

74. Dauriz M, Targher G, Laroche C, Temporelli PL, Ferrari R. Association between diabetes and 1-year adverse clinical outcomes in a multinational cohort of ambulatory patients with chronic heart failure: results from the ESC-HFA Heart Failure Long-Term Registry. Diabetes Care. 2017;40:671-8.
75. Lawson CA, Jones PW, Teece L, Dunbar SB, Seferovic PM, Khunti K, et al. Association between type 2 diabetes and all-cause hospitalization and mortality in the UK general heart failure population: stratification by diabetic glycemic control and medication intensification. JACC Heart Fail. 2018;6:18-26.
76. Shekelle PG, Rich MW, Morton SC, Atkinson CS, Tu W, Maglione M, et al. Efficacy of angiotensin converting enzyme inhibitors and beta-blockers in the management of left ventricular systolic dysfunction according to race, gender, and diabetic status: a meta-analysis of major clinical trials. J Am Coll Cardiol. 2003;41:1529–38.
77. Bell DS, Lukas MA, Holdbrook FK, Fowler MB. The effect of carvedilol on mortality risk in heart failure patients with diabetes: results of a meta-analysis. Curr Med Res Opin. 2006;22:287-96.
78. Haas SJ, Vos T, Gilbert RE, Krum H. Are beta-blockers as efficacious in patients with diabetes mellitus as in patients without diabetes mellitus who have chronic heart failure? A meta-analysis of large-scale clinical trials. Am Heart J. 2003;146:848-53.
79. Arora S, Patel P, Lahewala S, Patel N, Patel NJ, Thakore K, et al. Etiologies, trends, and predictors of 30-day readmission in patients with heart failure. Am J Cardiol. 2017;119:760-9.
80. Kannel WB, Hjortland M, Castelli WP. Role of diabetes in congestive heart failure: The Framingham study. Am J Cardiol. 1974;34:29-34.
81. Seferović PM, Paulus WJ. Clinical diabetic cardiomyopathy: a

two‐faced disease with restrictive and dilated phenotypes. Eur Heart J. 2015;36:1718-27.

82. Rosano GM, Vitale C, Seferovic P. Heart failure in patients with diabetes mellitus. Card Fail Rev. 2017;3:52-5.

| Sr. No. | CR/MRD No. | Identification Data | | | | | Presenting Complaints | | | | | | | | | | | | | | | | | | | | | | | | | | | | Drug | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Name | Age | Sex | DOA | DOD | Breathlessness | | Feet swelling | | Palpitation | | Fatigue | | Syncope | | Chest Pain | | Orthopnea | | PND | | Fever | | Surgical stress | | DM-2 | | Any other comorbidity | | | | | | | | |
| | | | | | | | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | HTN | Hypothyroidism | Hyperthyroidism | ACE-I/ ARBs | CCBs | | |
| 1 | 654320 | RL | 62 | M | 3-Jan-19 | 8-Jan-19 | Y | 30 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 25 | Y | N | N | Y | N | | |
| 2 | 647674 | SK | 84 | F | 3-Jan-19 | 14-Jan-19 | Y | 12 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 15 | N | N | N | N | N | | |
| 3 | 290146 | PK | 53 | F | 5-Jan-19 | 14-Jan-19 | Y | 3 | N | 0 | N | 0 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | Y | 6 | N | N | N | N | N | | |
| 4 | 218767 | JS | 72 | M | 9-Jan-19 | 16-Jan-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | Y | 1 | Y | 1 | N | 0 | N | 0 | Y | 12 | Y | N | N | N | Y | | |
| 5 | 651673 | VA | 66 | F | 10-Jan-19 | 18-Jan-19 | Y | 3 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 5 | N | N | N | N | N | | |
| 6 | 151405 | MS | 73 | M | 10-Jan-19 | 18-Jan-19 | Y | 4 | Y | 10 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | Y | 28 | N | N | N | N | N | | |
| 7 | 651681 | K | 81 | F | 10-Jan-19 | 25-Jan-19 | Y | 10 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 4 | Y | 4 | N | 0 | N | 0 | Y | 15 | N | N | N | N | N | | |
| 8 | 310451 | JK | 80 | F | 10-Jan-19 | 22-Jan-19 | Y | 3 | N | 0 | N | 0 | Y | 7 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | Y | N | N | Y | | |
| 9 | 651414 | BG | 52 | F | 10-Jan-19 | 29-Jan-19 | Y | 3 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 17 | N | N | N | N | N | | |
| 10 | 548416 | JS | 73 | M | 11-Jan-19 | 31-Jan-19 | Y | 2 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | |
| 11 | 654294 | RR | 56 | F | 15-Jan-19 | 22-Jan-19 | Y | 7 | Y | 10 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 4 | N | N | N | N | N | | |
| 12 | 654311 | KK | 63 | F | 16-Jan-19 | 3-Feb-19 | Y | 14 | Y | 15 | N | 0 | N | 0 | N | 0 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 4 | N | N | N | N | N | | |
| 13 | 624092 | HK | 72 | F | 16-Jan-19 | 18-Jan-19 | Y | 10 | Y | 30 | N | 0 | Y | 15 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 19 | N | N | N | N | N | | |
| 14 | 655530 | KK | 85 | F | 18-Jan-19 | 25-Jan-19 | Y | 12 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 25 | Y | N | N | Y | N | | |
| 15 | 657232 | K | 43 | F | 21-Jan-19 | 25-Jan-19 | Y | 6 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | |
| 16 | 837915 | JR | 60 | M | 24-Jan-19 | 13-Feb-19 | Y | 5 | N | 0 | N | 0 | Y | 12 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 20 | N | N | N | N | N | | |
| 17 | 9659867 | AK | 70 | F | 25-Jan-19 | 6-Feb-19 | Y | 1 | N | 0 | N | 0 | Y | 2 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | Y | Y | N | | |
| 18 | 431368 | JK | 88 | F | 27-Jan-19 | 5-Feb-19 | Y | 10 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 20 | N | N | N | N | N | | |
| 19 | 431368 | JK | 90 | F | 27-Jan-19 | 9-Feb-19 | Y | 30 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 20 | N | Y | N | N | N | | |
| 20 | 643392 | SR | 49 | F | 6-Feb-19 | 27-Feb-19 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | Y | N | N | N | Y | | |
| 21 | 667293 | GK | 60 | F | 7-Feb-19 | 27-Feb-19 | Y | 1 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 4 | N | N | N | N | N | | |
| 22 | 667329 | CK | 60 | F | 7-Feb-19 | 24-Feb-19 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 25 | Y | N | N | Y | N | | |
| 23 | 667822 | SD | 67 | F | 8-Feb-19 | 26-Feb-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 2 | Y | N | N | N | Y | | |
| 24 | 668650 | HR | 69 | F | 10-Feb-19 | 25-Feb-19 | Y | 1 | Y | 5 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | Y | 3 | N | N | N | N | N | | |
| 25 | 295668 | GS | 82 | M | 14-Feb-19 | 3-Mar-19 | Y | 15 | Y | 40 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 15 | N | 0 | N | 0 | N | 0 | Y | 14 | N | N | N | N | N | | |
| 26 | 399833 | PS | 62 | M | 15-Feb-19 | 16-Feb-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | |
| 27 | 716440 | NK | 60 | F | 16-Feb-19 | 28-Feb-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | Y | N | N | N | | |
| 28 | 672832 | AS | 70 | M | 17-Feb-19 | 21-Feb-19 | Y | 4 | Y | 1 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 8 | Y | N | N | Y | N | | |
| 29 | 673763 | TL | 71 | M | 19-Feb-19 | 28-Feb-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | N | | |
| 30 | 426562 | KK | 76 | F | 22-Feb-19 | 28-Feb-19 | Y | 11 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | Y | N | N | Y | | |
| 31 | 678677 | RS | 44 | M | 26-Feb-19 | 10-Mar-19 | Y | 4 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | Y | N | N | Y | N | | |
| 32 | 680134 | NK | 75 | F | 28-Feb-19 | 10-Mar-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | |
| 33 | 170613 | KC | 58 | F | 5-Mar-19 | 16-Mar-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | Y | Y | N | N | Y | | |
| 34 | 685690 | SM | 61 | M | 9-Mar-19 | 12-Mar-19 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | Y | N | | |
| 35 | 338758 | RL | 65 | M | 11-Mar-19 | 25-Mar-19 | Y | 1 | N | 0 | N | 0 | Y | 7 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 14 | N | N | N | N | N | | |
| 36 | 641563 | SK | 66 | M | 11-Mar-19 | 18-Mar-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | Y | 12 | Y | N | N | Y | N | | |
| 37 | 687528 | BK | 60 | F | 12-Mar-19 | 28-Mar-19 | Y | 7 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 7 | N | 0 | N | 0 | N | 0 | Y | 12 | Y | N | N | Y | N | | |
| 38 | 310522 | RK | 58 | M | 13-Mar-19 | 2-Apr-19 | Y | 1 | N | 0 | Y | 1 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 4 | Y | N | N | Y | N | | |
| 39 | 148473 | JS | 53 | M | 15-Mar-19 | 22-Mar-19 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 4 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | |
| 40 | 690371 | BK | 58 | F | 17-Mar-19 | 30-Mar-19 | Y | 10 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 3 | N | N | N | N | N | | |
| 41 | 692141 | KK | 85 | F | 19-Mar-19 | 30-Mar-19 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | |
| 42 | 692138 | SA | 60 | M | 19-Mar-19 | 24-Mar-19 | Y | 2 | Y | 5 | N | 0 | Y | 5 | N | 0 | N | 0 | Y | 2 | N | 0 | N | 0 | N | 0 | Y | 12 | N | N | N | N | N | | |
| 43 | 691646 | MS | 73 | M | 20-Mar-19 | 27-Mar-19 | Y | 30 | Y | 20 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 13 | N | N | N | N | N | | |
| 44 | 690622 | GK | 66 | F | 20-Mar-19 | 2-Apr-19 | Y | 15 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 10 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 20 | Y | N | N | Y | Y | | |
| 45 | 693144 | JK | 63 | F | 21-Mar-19 | 17-Apr-19 | Y | 3 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 2 | Y | N | N | N | Y | | |
| 46 | 311305 | AK | 63 | M | 21-Mar-19 | 2-Apr-19 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | |
| 47 | 693491 | GB | 72 | M | 22-Mar-19 | 12-Apr-19 | Y | 30 | N | 0 | Y | 5 | N | 0 | N | 0 | N | 0 | Y | 10 | Y | 10 | N | 0 | N | 0 | Y | 10 | Y | N | N | Y | N | | |
| 48 | 233528 | DR | 63 | F | 24-Mar-19 | 6-Apr-19 | Y | 60 | Y | 20 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 10 | Y | N | N | N | N | | |
| 49 | 256653 | KS | 59 | M | 27-Mar-19 | 16-Apr-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 8 | Y | N | N | Y | N | | |
| 50 | 698039 | SK | 88 | F | 29-Mar-19 | 14-Apr-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | Y | 12 | Y | N | N | Y | N | | |
| 51 | 699635 | JJ | 43 | F | 1-Apr-19 | 5-Apr-19 | Y | 4 | Y | 5 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | Y | N | | |
| 52 | 874663 | KB | 78 | F | 1-Apr-19 | 5-Apr-19 | Y | 5 | Y | 15 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | |
| 53 | 631131 | PK | 50 | F | 3-Apr-19 | 11-Apr-19 | Y | 7 | Y | 7 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 7 | Y | 7 | N | 0 | N | 0 | Y | 3 | N | N | N | N | N | | |
| 54 | 831254 | SS | 53 | M | 7-Apr-19 | 15-Apr-19 | Y | 20 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 15 | N | N | N | N | N | | |
| 55 | 685416 | GN | 79 | M | 9-Apr-19 | 19-Apr-19 | Y | 12 | Y | 12 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 12 | N | 0 | N | 0 | N | 0 | Y | 16 | Y | N | N | Y | N | | |
| 56 | 733066 | MS | 64 | M | 9-Apr-19 | 20-Apr-19 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 9 | N | 0 | Y | 7 | Y | N | N | N | N | | |
| 57 | 369699 | PL | 70 | F | 10-Apr-19 | 13-Apr-19 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 16 | Y | 16 | N | 0 | N | 0 | Y | 10 | N | N | N | N | N | | |
| 58 | 26965 | AK | 58 | F | 12-Apr-19 | 19-Apr-19 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 2 | N | 0 | N | 0 | N | 0 | Y | 3 | Y | N | N | Y | N | | |
| 59 | 512618 | SK | 53 | M | 13-Apr-19 | 3-May-19 | Y | 5 | Y | 5 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 8 | Y | N | N | N | Y | | |
| 60 | 709462 | AK | 73 | F | 15-Apr-19 | 24-Apr-19 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 15 | Y | N | N | N | Y | | |
| 61 | 147985 | SD | 81 | F | 17-Apr-19 | 2-May-19 | Y | 4 | Y | 15 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 14 | Y | Y | N | `Y | Y | | |
| 62 | 704987 | RK | 50 | M | 18-Apr-19 | 30-Apr-19 | Y | 4 | N | 0 | N | 0 | Y | 7 | N | 0 | N | 0 | Y | 4 | Y | 4 | N | 0 | N | 0 | Y | 4 | N | N | N | N | N | | |
| 63 | 712258 | MS | 37 | M | 19-Apr-19 | 22-Apr-19 | Y | 30 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | |
| 64 | 825364 | BS | 65 | M | 27-Apr-19 | 5-May-19 | Y | 8 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 10 | N | 0 | Y | 20 | N | N | N | N | N | | |
| 65 | 244703 | VK | 72 | F | 28-Apr-19 | 7-May-19 | Y | 3 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 14 | Y | N | N | Y | N | | |
| 66 | 718554 | SD | 85 | F | 29-Apr-19 | 2-May-19 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | |
| 67 | 569084 | SR | 71 | F | 29-Apr-19 | 8-May-19 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | |
| 68 | 426562 | KK | 78 | F | 4-May-19 | 10-May-19 | Y | 3 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | Y | N | Y | N | | |
| 69 | 725304 | GK | 50 | M | 10-May-19 | 18-May-19 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 2 | N | 0 | N | **0** | N | 0 | N | 0 | Y | 2 | N | N | N | N | N | | |
| 70 | 727316 | HL | 69 | M | 13-May-19 | 29-May-19 | Y | 6 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 6 | N | 0 | N | 0 | N | 0 | Y | 20 | Y | N | N | N | Y | | |
| 71 | 728685 | SD | 68 | F | 14-May-19 | 19-May-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | |
| 72 | 830529 | SD | 50 | F | 15-May-19 | 28-May-19 | Y | 10 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 3 | N | 0 | Y | 4 | N | N | N | N | N | | |
| 73 | 729462 | MS | 60 | M | 16-May-19 | 22-May-19 | Y | 1 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 10 | N | N | N | N | N | | |

| Sr. No. | CR/MRD No. | History | | Personal History | | | Family History | General Physical Examination | | | | | | | | | | | Systemic Examination | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Thyroxine | NMZ | Alcohol | I/V drug abuse | Smoking | Family h/o DM-2 | Pulse | SBP | DBP | RR | SPO2 | BMI | Pallor | Cyanosis | Clubbing | Edema | JVP | CVS | | Respiratory System | Abdomen | | Hemoglobin (gm/dl) | TLC (x $10^3$/mm$^3$) | N/L/M/E/B (%) | Patelet Count (x $10^3$/mm$^3$) | MCV (fl) | MCH (pg) | MCHC (%) | ESR |
| | | | | | | | | | | | | | | | | | | | S1 | S2 | Pulmonary Rales | Hepatomegaly | Splenomegaly | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm |
| 1 | 654320 | N | N | Y | N | N | Y | 84 | 110 | 70 | 18 | 98 | 25.9 | A | A | A | P | A | P | P | P | A | A | 11.40 | 11.70 | 78/15/5/0/1 | 314 | 79.00 | 26.60 | 33.50 | 25.00 |
| 2 | 647674 | N | N | N | N | N | N | 86 | 120 | 74 | 20 | 96 | 23 | A | A | A | A | A | P | P | A | A | A | 7.90 | 2.30 | 51.6/40.9/6.9/0.2 | 328 | 80.00 | 26.30 | 32.90 | 25.00 |
| 3 | 290146 | N | N | N | N | N | N | 92 | 110 | 60 | 20 | 98 | 28.9 | A | A | A | A | A | P | P | A | A | A | 9.90 | 13.30 | 93/3.4/2.8/0/0 | 282 | 82.70 | 26.00 | 31.40 | 30.00 |
| 4 | 218767 | N | N | Y | N | N | N | 96 | 100 | 60 | 20 | 98 | 28.1 | A | A | A | P | A | P | P | A | A | A | 14.10 | 13.60 | 73/18/7/1/3 | 120 | 84.00 | 32.00 | 27.00 | 42.00 |
| 5 | 651673 | N | N | N | N | N | Y | 118 | 110 | 80 | 22 | 94 | 22 | A | A | A | A | A | P | P | P | A | A | 7.60 | 7.10 | 75/22/3/0/0 | 110 | 79.00 | 32.00 | 25.00 | 18.00 |
| 6 | 151405 | N | N | Y | N | N | N | 80 | 160 | 80 | 20 | 98 | 27.2 | A | A | A | P | P | P | P | P | A | A | 10.90 | 6.30 | 72/15/11/2/0 | 160 | 86.80 | 28.00 | 31.00 | 24.00 |
| 7 | 651681 | N | N | Y | N | Y | N | 98 | 130 | 70 | 18 | 98 | 21.2 | A | A | A | P | P | P | P | A | A | A | 9.40 | 13.80 | 64/16/14/4/0 | 155 | 76.70 | 24.50 | 31.90 | 14.00 |
| 8 | 310451 | Y | N | N | N | N | N | 100 | 150 | 80 | 24 | 98 | 21 | A | A | A | A | P | P | P | P | A | A | 12.80 | 13.20 | 90/5/4/1/0 | 225 | 88.60 | 32.10 | 28.40 | 28.00 |
| 9 | 651414 | N | N | N | N | N | N | 93 | 130 | 80 | 18 | 98 | 26.9 | P | A | A | P | A | P | P | A | A | A | 3.10 | 15.50 | 93/6/0/1/0 | 315 | 81.70 | 26.00 | 31.90 | 140.00 |
| 10 | 548416 | N | N | Y | N | N | N | 148 | 156 | 96 | 32 | 90 | 25 | P | A | A | A | P | P | P | P | A | A | 10.60 | 11.20 | 84/2/10/2/2 | 247 | 98.20 | 28.10 | 32.10 | 18.00 |
| 11 | 654294 | N | N | N | N | N | N | 102 | 140 | 70 | 18 | 92 | 25.6 | A | A | A | P | A | P | P | P | A | A | 7.00 | 8.40 | 82/10/8/0/0 | 157 | 75.30 | 23.00 | 30.50 | 22.00 |
| 12 | 654311 | N | N | N | N | N | N | 84 | 110 | 70 | 24 | 92 | 31.2 | A | A | A | P | P | P | P | P | A | A | 8.70 | 9.30 | 67/20/9/24/3 | 275 | 72.80 | 22.70 | 31.20 | 26.00 |
| 13 | 624092 | N | N | N | N | N | Y | 98 | 150 | 90 | 24 | 98 | 25.9 | A | A | A | P | A | P | P | P | A | A | 8.20 | 7.00 | 51/42/6/0/0 | 416 | 68.90 | 21.60 | 31.40 | 71.00 |
| 14 | 655530 | N | N | N | N | N | N | 80 | 120 | 70 | 20 | 96 | 20.3 | A | A | A | A | A | P | P | P | A | A | 12.80 | 24.10 | 91/5/4/0/0 | 310 | 86.30 | 28.00 | 32.00 | 30.00 |
| 15 | 657232 | N | N | N | N | N | N | 82 | 130 | 80 | 22 | 96 | 24 | A | A | A | A | A | P | P | P | A | A | 11.10 | 6.10 | 45/4.2/10/0.6/0.6 | 193 | 76.30 | 24.00 | 31.40 | 36.00 |
| 16 | 837915 | N | N | N | N | Y | Y | 90 | 140 | 80 | 24 | 98 | 19 | P | A | A | P | A | P | P | P | A | A | 9.50 | 6.60 | 83/9/7.4/0/0 | 140 | 89.60 | 30.10 | 33.60 | 14.00 |
| 17 | 9659867 | N | Y | N | N | N | N | 125 | 140 | 60 | 18 | 98 | 24 | A | A | A | A | A | P | P | A | A | A | 9.90 | 12.60 | 91/4/5/00/0 | 367 | 79.40 | 28.00 | 32.00 | 18.00 |
| 18 | 431368 | N | N | N | N | N | Y | 147 | 160 | 90 | 24 | 100 | 18.5 | P | A | A | A | A | P | P | P | A | A | 10.20 | 8.40 | 82/9/9/0/0 | 199 | 83.30 | 26.20 | 30.50 | 40.00 |
| 19 | 431368 | Y | N | N | N | N | N | 96 | 100 | 60 | 20 | 84 | 24 | A | A | A | A | P | P | P | P | A | A | 9.40 | 10.80 | 74/15/8/2/1 | 156 | 83.00 | 25.50 | 30.80 | 64.00 |
| 20 | 643392 | N | N | N | N | N | N | 150 | 110 | 70 | 18 | 94 | 26 | A | A | A | A | A | P | P | P | A | A | 11.00 | 15.00 | 51/42/3/3/0 | 258 | 87.30 | 34.20 | 32.20 | 63.00 |
| 21 | 667293 | N | N | N | N | N | N | 86 | 130 | 70 | 22 | 100 | 32 | P | A | A | A | A | P | P | A | A | A | 10.80 | 28.20 | 86/0/9/3/1 | 311 | 80.00 | 26.00 | 32.50 | 50.00 |
| 22 | 667329 | N | N | N | N | N | Y | 90 | 100 | 70 | 28 | 77 | 21.6 | A | A | A | A | P | P | P | P | A | A | 11.40 | 9.70 | 86/10/4/0/0 | 244 | 84.70 | 26.80 | 31.60 | 75.00 |
| 23 | 667822 | N | N | N | N | N | N | 100 | 110 | 60 | 24 | 96 | 31.6 | A | A | A | A | A | P | P | P | A | A | 11.70 | 11.30 | 87/8/4/1/0 | 211 | 93.30 | 30.00 | 32.10 | 20.00 |
| 24 | 668650 | N | N | N | N | N | Y | 90 | 110 | 70 | 24 | 96 | 33.5 | A | A | A | P | A | P | P | P | A | A | 10.80 | 6.80 | 79/9/11/0/0 | 187 | 64.30 | 19.60 | 30.50 | 26.00 |
| 25 | 295668 | N | N | Y | N | N | Y | 94 | 120 | 70 | 18 | 94 | 26 | A | A | A | P | P | P | P | P | A | A | 11.70 | 5.80 | 63/26/10/1/0 | 174 | 90.70 | 28.00 | 32.00 | 42.00 |
| 26 | 399833 | N | N | N | N | N | Y | 76 | 130 | 80 | 20 | 96 | 25.4 | A | A | A | A | A | P | P | P | A | A | 16.30 | 10.80 | 74/17/7/2/0 | 196 | 100.00 | 28.00 | 32.00 | 15.00 |
| 27 | 716440 | N | Y | N | N | N | N | 123 | 120 | 80 | 27 | 95 | 21 | A | A | A | A | A | P | P | P | A | A | 12.90 | 18.30 | 79/11/9/0/0 | 176 | 83.50 | 26.90 | 32.30 | 83.00 |
| 28 | 672832 | N | N | N | N | N | Y | 108 | 110 | 70 | 24 | 90 | 27.4 | A | A | A | P | A | P | P | P | A | A | 9.60 | 10.60 | 91/4/4/0/0 | 182 | 91.60 | 30.20 | 33.00 | 40.00 |
| 29 | 673763 | N | N | N | N | Y | N | 75 | 140 | 80 | 22 | 94 | 26 | A | A | A | P | A | P | P | P | A | A | 14.50 | 18.30 | 89.3/2.5/8.2/0 | 203 | 85.00 | 28.00 | 32.90 | 18.00 |
| 30 | 426562 | Y | N | N | N | N | N | 100 | 180 | 100 | 20 | 95 | 28 | A | A | A | A | P | P | P | P | A | A | 14.90 | 9.60 | 66/23/10/01 | 389 | 87.90 | 72.00 | 23.10 | 25.00 |
| 31 | 678677 | N | N | Y | N | N | N | 100 | 110 | 70 | 22 | 100 | 31.2 | A | A | A | P | A | P | P | P | A | A | 13.40 | 13.70 | 74/17/8/1/0 | 353 | 92.30 | 28.90 | 31.30 | 45.00 |
| 32 | 680134 | N | N | N | N | N | Y | 90 | 160 | 80 | 22 | 96 | 27 | A | A | A | P | A | P | P | P | A | A | 12.00 | 19.00 | 88/8.5/3.4 | 307 | 88.10 | 29.20 | 33.20 | 10.00 |
| 33 | 170613 | Y | N | N | N | N | Y | 88 | 110 | 80 | 18 | 94 | 28 | A | A | A | A | A | P | P | A | A | A | 7.60 | 8.20 | 58/32/8/0/0 | 281 | 78.00 | 31.00 | 24.00 | 16.00 |
| 34 | 685690 | N | N | N | N | N | N | 84 | 140 | 80 | 16 | 94 | 22.3 | A | A | A | A | A | P | P | P | A | A | 13.90 | 14.30 | 88/8/3/0/0 | 204 | 88.00 | 28.00 | 31.00 | 30.00 |
| 35 | 338758 | N | N | Y | N | N | Y | 80 | 120 | 70 | 20 | 98 | 25.2 | A | A | A | A | A | P | P | A | A | A | 10.00 | 20.90 | 82/10/6/2/1 | 317 | 87.70 | 28.00 | 30.00 | 110.00 |
| 36 | 641563 | N | N | Y | N | N | N | 80 | 160 | 90 | 20 | 99 | 21.6 | A | A | A | A | A | P | P | A | A | A | 11.10 | 9.30 | 13.8/76/06/2/1 | 340 | 93.80 | 28.00 | 30.00 | 80.00 |
| 37 | 687528 | N | N | N | N | N | N | 112 | 140 | 80 | 20 | 94 | 27.3 | A | A | A | A | P | P | P | P | P | A | 10.60 | 9.30 | 77/15/7/1/0 | 378 | 82.50 | 29.00 | 31.00 | 18.00 |
| 38 | 310522 | N | N | Y | N | N | Y | 80 | 120 | 70 | 20 | 94 | 29.2 | A | A | A | A | A | P | P | A | A | A | 12.70 | 10.20 | 56/31/9/3/0 | 359 | 81.70 | 29.00 | 30.00 | 70.00 |
| 39 | 148473 | N | N | N | N | N | Y | 98 | 140 | 90 | 22 | 98 | 24.2 | A | A | A | P | A | P | P | P | A | A | 12.00 | 6.10 | 62/23/12/2/0 | 149 | 83.50 | 31.70 | 26.50 | 24.00 |
| 40 | 690371 | N | N | N | N | N | N | 81 | 150 | 60 | 24 | 100 | 25.6 | A | A | A | P | A | P | P | P | A | A | 11.60 | 8.10 | 63/25/9/2/0 | 430 | 89.70 | 28.10 | 31.40 | 10.00 |
| 41 | 692141 | N | N | N | N | N | N | 87 | 110 | 70 | 22 | 90 | 24.4 | A | A | A | P | A | P | P | P | A | A | 13.20 | 10.40 | 95.8/2.5/1.7/0 | 173 | 86.00 | 26.30 | 30.60 | 49.00 |
| 42 | 692138 | N | N | Y | N | N | N | 60 | 170 | 70 | 33 | 90 | 29.1 | A | A | A | P | A | P | P | P | A | A | 9.80 | 8.20 | 63.2/21/11.8/3.3/0.3 | 150 | 83.00 | 27.10 | 32.70 | 28.00 |
| 43 | 691646 | N | N | Y | N | N | N | 104 | 120 | 80 | 24 | 93 | 26.2 | A | A | A | P | A | P | P | P | A | A | 11.10 | 3.70 | 65/30/4/1/0 | 100 | 73.90 | 23.30 | 31.50 | 16.00 |
| 44 | 690622 | N | N | N | N | N | Y | 100 | 128 | 68 | 22 | 96 | 22.5 | A | A | A | A | A | P | P | P | A | A | 8.50 | 8.90 | 58/31/9/2/0 | 269 | 82.20 | 26.00 | 31.60 | 42.00 |
| 45 | 693144 | N | N | N | N | N | Y | 96 | 130 | 70 | 26 | 98 | 30.86 | A | A | A | A | A | P | P | P | A | A | 8.90 | 10.20 | 91/5/3/0/0 | 194 | 71.60 | 22.50 | 31.50 | 112.00 |
| 46 | 311305 | N | N | Y | Y | N | Y | 126 | 140 | 90 | 22 | 96 | 26.5 | A | A | A | P | A | P | P | P | A | A | 13.20 | 6.00 | 60.9/27/7.7/3 | 110 | 72.00 | 21.40 | 29.70 | 40.00 |
| 47 | 693491 | N | N | N | N | N | N | 103 | 100 | 70 | 30 | 90 | 35 | A | A | A | P | A | P | P | P | A | A | 13.40 | 8.70 | 74/8/7/1/0 | 237 | 88.40 | 28.20 | 31.80 | 40.00 |
| 48 | 233528 | N | N | N | N | N | Y | 80 | 120 | 70 | 20 | 96 | 25 | A | A | A | A | A | P | P | A | A | A | 9.80 | 12.90 | 66/25/5/4/2 | 325 | 84.20 | 24.00 | 28.10 | 31.00 |
| 49 | 256653 | N | N | Y | N | N | N | 91 | 110 | 90 | 22 | 95 | 32.2 | A | A | A | P | A | P | P | P | P | A | 14.70 | 18.20 | 51/40/7/1/1 | 302 | 90.00 | 28.80 | 31.90 | 24.00 |
| 50 | 698039 | N | N | N | N | N | N | 120 | 110 | 70 | 20 | 96 | 28.4 | P | A | A | A | A | P | P | A | P | A | 13.00 | 16.80 | 53/35/11/1/0 | 297 | 88.30 | 27.80 | 31.50 | 26.00 |
| 51 | 699635 | N | N | N | N | N | N | 96 | 120 | 80 | 26 | 98 | 22 | A | A | A | P | P | P | P | P | A | A | 11.00 | 11.90 | 90/10/3/1/0 | 158 | 92.00 | 31.00 | 30.00 | 30.00 |
| 52 | 874663 | N | N | N | N | N | N | 108 | 120 | 70 | 26 | 98 | 28 | A | A | A | P | A | P | P | P | A | A | 10.40 | 19.70 | 90/24/3/3/0 | 186 | 9.00 | 30.20 | 32.60 | 14.00 |
| 53 | 631131 | N | N | N | N | N | Y | 86 | 120 | 80 | 24 | 49 | 30.9 | A | A | A | P | A | P | P | P | A | A | 11.00 | 8.50 | 72/20/5/2/0 | 281 | 85.90 | 28.60 | 33.30 | 60.00 |
| 54 | 831254 | N | N | N | N | N | N | 107 | 110 | 70 | 24 | 98 | 27.6 | A | A | A | A | P | P | P | P | A | A | 10.90 | 14.70 | 79/15/5/0/0 | 397 | 87.10 | 27.60 | 31.60 | 56.00 |
| 55 | 685416 | N | N | N | N | N | Y | 94 | 110 | 80 | 22 | 94 | 20.4 | A | A | A | P | A | P | P | P | A | A | 10.20 | 6.60 | 92/5/2/0/0 | 196 | 86.50 | 28.10 | 32.50 | 14.00 |
| 56 | 733066 | N | N | N | N | N | N | 52 | 80 | 60 | 28 | 90 | 30.3 | P | A | A | A | A | P | P | P | A | A | 11.40 | 9.50 | 75.7/13.5/5.8/4.4/.6 | 329 | 83.80 | 27.20 | 32.50 | 28.00 |
| 57 | 369699 | N | N | N | N | N | N | 108 | 120 | 80 | 18 | 98 | 23.5 | A | A | A | P | A | P | P | P | A | A | 10.60 | 8.50 | 82/87/8/4/0 | 138 | 80.90 | 24.60 | 31.20 | 32.00 |
| 58 | 26965 | N | N | N | N | N | N | 84 | 160 | 90 | 20 | 96 | 23.1 | A | A | A | A | P | P | P | P | A | A | 9.80 | 8.90 | 78/15/6/1/0 | 199 | 81.50 | 29.00 | 31.00 | 50.00 |
| 59 | 512618 | N | N | N | N | N | Y | 82 | 110 | 70 | 20 | 98 | 25.1 | A | A | A | P | P | P | P | P | A | A | 13.70 | 8.00 | 70/21/7/0/0 | 155 | 84.90 | 28.00 | 31.00 | 15.00 |
| 60 | 709462 | N | N | N | N | N | N | 102 | 90 | 60 | 18 | 96 | 24.6 | A | A | A | A | A | P | P | A | A | A | 10.80 | 8.40 | 74/16/8/2/0 | 213 | 81.50 | 30.00 | 32.00 | 80.00 |
| 61 | 147985 | N | N | N | N | N | Y | 78 | 150 | 84 | 20 | 98 | 24 | A | A | A | P | P | P | P | P | A | A | 7.30 | 11.50 | 63/25/10/02/1 | 308 | 69.80 | 26.00 | 30.00 | 50.00 |
| 62 | 704987 | N | N | N | N | N | N | 96 | 110 | 70 | 22 | 96 | 27.4 | A | A | A | P | A | P | P | P | P | A | 8.50 | 12.30 | 77/12/8/2/0 | 232 | 76.90 | 23.60 | 30.80 | 76.00 |
| 63 | 712258 | N | N | N | N | N | Y | 100 | 130 | 70 | 28 | 98 | 28 | A | A | A | P | A | P | P | P | A | A | 13.60 | 7.40 | 54/35/9/1/0 | 155 | 90.40 | 29.70 | 32.90 | 10.00 |
| 64 | 825364 | N | N | N | N | N | N | 143 | 130 | 70 | 26 | 98 | 40.8 | A | A | A | P | A | P | P | P | A | A | 8.30 | 20.90 | 87.2/6.3/6.2/0/0.3 | 368 | 82.20 | 26.40 | 82.10 | 98.00 |
| 65 | 244703 | N | N | N | N | N | N | 76 | 70 | 40 | 20 | 84 | 28.4 | A | A | A | P | P | P | P | P | A | A | 8.50 | 16.50 | 83/13/4/0/1 | 150 | 86.00 | 27.20 | 30.00 | 120.00 |
| 66 | 718554 | N | N | N | N | N | N | 86 | 90 | 60 | 22 | 98 | 20.4 | A | A | A | P | P | P | P | P | A | A | 11.60 | 34.00 | 95/2/2/0/0 | 382 | 85.80 | 27.50 | 32.00 | 18.00 |
| 67 | 569084 | N | N | N | N | N | N | 90 | 110 | 60 | 20 | 98 | 24 | A | A | A | A | A | P | P | P | A | A | 10.70 | 7.80 | 85/8/5/2/0 | 175 | 86.30 | 28.00 | 32.40 | 28.00 |
| 68 | 426562 | Y | N | N | N | N | N | 100 | 180 | 100 | 22 | 92 | 24.3 | A | A | A | A | A | P | P | P | A | A | 14.90 | 9.60 | 66/23/10/1/0 | 389 | 87.90 | 28.00 | 32.00 | 80.00 |
| 69 | 725304 | N | N | Y | N | N | N | 68 | 130 | 70 | 22 | 98 | 21 | A | A | A | A | A | P | P | A | A | A | 14.70 | 6.10 | 55/37/6/2/0 | 182 | 83.50 | 24.00 | 28.00 | 15.00 |
| 70 | 727316 | N | N | N | N | N | N | 106 | 110 | 70 | 20 | 88 | 23.8 | P | A | A | A | A | P | P | P | A | A | 11.20 | 9.70 | 96/2/1/0/1 | 365 | 93.80 | 29.80 | 31.80 | 75.00 |
| 71 | 728685 | N | N | N | N | N | Y | 64 | 150 | 80 | 20 | 94 | 21 | A | A | A | A | A | P | P | P | A | A | 10.90 | 17.10 | 87/9/4/0/0 | 243 | 82.10 | 29.00 | 31.00 | 25.00 |
| 72 | 830529 | N | N | N | N | N | N | 76 | 120 | 70 | 20 | 94 | 24.3 | A | A | A | A | A | P | P | A | A | A | 8.90 | 13.90 | 88.9/7.7/3.4/0/0 | 98 | 91.90 | 29.50 | 32.10 | 38.00 |
| 73 | 729462 | N | N | Y | N | N | Y | 98 | 90 | 60 | 20 | 98 | 24 | A | A | A | P | A | P | P | P | A | A | 10.70 | 7.80 | 79/12/8/0/0 | 151 | 85.10 | 27.00 | 30.00 | 16.00 |

| Sr. No. | CR/MRD No. | Laboratory Investigation | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RFT Creatinine (mg/dl) | RFT Urea (mg/dl) | RFT Sodium (mmol/l) | RFT Potassium (mmol/l) | RFT Chloride (mmol/l) | RBS (mg/dl) | HbA1C | LFT Total bilirubin (mg/dl) | LFT Direct bilirubin (mg/dl) | LFT ALT (u/l) | LFT AST (u/l) | LFT ALP (u/l) | LFT Total protein (g/dl) | LFT Serum albumin (g/dl) | BNP Levels (pg/ml) | Trop-T (ng/ml) Levels (Where available) | ECG | Chest X-RAY | 2-D ECHO AORTIC ROOT | 2-D ECHO LEFT ATRIUM | 2-D ECHO RIGHT ATRIUM | 2-D ECHO RVID (D) | 2-D ECHO IVST (D/S) |
| | | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm |
| 1 | 654320 | 1.70 | 63 | 132 | 4.05 | 95 | 363 | 12.3 | 1.12 | 0.10 | 86 | 98 | 103 | 6.40 | 2.90 | 219 | NA | NSR | NORMAL | 25 | 44 | 20 | 22 | 8/9 |
| 2 | 647674 | 1.50 | 96 | 138 | 4.50 | 87 | 204 | 10.40 | 1.12 | 0.16 | 46 | 28 | 148 | 8.60 | 3.10 | 920 | NA | NSR | B/L LZ HAZINESS | 28 | 29 | 30 | 22 | 9/10 |
| 3 | 290146 | 1.47 | 60 | 142 | 3.68 | 100 | 220 | 9.00 | 1.12 | 0.10 | 297 | 142 | 174 | 6.30 | 3.80 | 1770 | NA | ST-T CHANGES | B/L LZ HAZINESS | 25 | 37 | 20 | 22 | 9/12 |
| 4 | 218767 | 1.09 | 72 | 129 | 4.17 | 97 | 256 | 10.2 | 1.12 | 0.18 | 42 | 32 | 134 | 8.90 | 3.60 | 1190 | NA | ST-T CHANGES | B/L LZ HAZINESS | 26 | 36 | 21 | 24 | 10/12 |
| 5 | 651673 | 1.20 | 62 | 141 | 4.40 | 99 | 158 | 7.80 | 1.01 | 0.49 | 25 | 48 | 65 | 8.10 | 4.10 | 2390 | NA | ST-T CHANGES | B/L LZ HAZINESS | 27 | 42 | 20 | 22 | 10/12 |
| 6 | 151405 | 1.60 | 22 | 137 | 3.50 | 93 | 157 | 8.20 | 0.50 | 0.30 | 13 | 17 | 113 | 6.30 | 3.30 | 2510 | NA | BBB | B/L LZ HAZINESS | 25 | 53 | 57 | 46 | 8/11 |
| 7 | 651681 | 1.89 | 118 | 132 | 3.07 | 92 | 185 | 7.40 | 0.33 | 0.22 | 26 | 48 | 69 | 5.30 | 2.60 | 686 | 0.03 | NSR | LEFT PLEURAL EFFUSION | 29 | 42 | 20 | 22 | 15/16 |
| 8 | 310451 | 0.70 | 52 | 137 | 4.30 | 100 | 148 | 4.50 | 1.12 | 0.20 | 33 | 30 | 124 | 6.80 | 4.30 | 708 | 0.03 | NSR | B/L LZ HAZINESS | 25 | 45 | 25 | 20 | 13/14 |
| 9 | 651414 | 1.52 | 84 | 130 | 5.26 | 97 | 498 | 15.9 | 1.12 | 0.09 | 9 | 15 | 361 | 6.20 | 2.00 | 1630 | NA | ST-T CHANGES | B/L LZ HAZINESS | 29 | 30 | 20 | 22 | 10/12 |
| 10 | 548416 | 0.90 | 18 | 132 | 4.50 | 109 | 119 | NA | 1.12 | 0.20 | 46 | 49 | 94 | 6.40 | 2.10 | 614 | NA | NSR | RT PLEURAL EFFUSION | 26 | 32 | 20 | 22 | 7/8 |
| 11 | 654294 | 0.75 | 25 | 130 | 4.60 | 104 | 208 | 7.20 | 0.75 | 0.24 | 101 | 157 | 149 | 5.70 | 2.70 | 592 | 0.05 | ST-T CHANGES | NORMAL | 20 | 68 | 20 | 22 | 10/12 |
| 12 | 654311 | 1.90 | 64 | 137 | 4.30 | 100 | 283 | 7.80 | 1.12 | 0.10 | 8 | 16 | 79 | 6.90 | 3.50 | 675 | 0.21 | NSR | B/L LZ HAZINESS | 27 | 32 | 20 | 22 | 9/10 |
| 13 | 624092 | 0.69 | 49 | 129 | 4.37 | 96 | 250 | 8.9 | 1.12 | 0.06 | 12 | 17 | 60 | 6.30 | 3.47 | 397 | NA | NSR | NORMAL | 29 | 44 | 20 | 22 | 13/16 |
| 14 | 655530 | 1.32 | 68 | 135 | 4.80 | 103 | 276 | 9.20 | 0.37 | 0.08 | 14 | 19 | 160 | 7.30 | 3.90 | 1510 | NA | NSR | NORMAL | 29 | 42 | 25 | 22 | 13/14 |
| 15 | 657232 | 1.00 | 20 | 120 | 3.65 | 101 | 180 | 6.00 | 1.12 | 0.30 | 28 | 20 | 120 | 7.30 | 3.10 | 347 | NA | LVH | NORMAL | 27 | 48 | 20 | 22 | 14/15 |
| 16 | 837915 | 0.73 | 26 | 148 | 2.90 | 103 | 166 | 7.8 | 1.12 | 0.08 | 11 | 20 | 70 | 7.40 | 2.20 | 1680 | 0.03 | ARRHYTHMIA | B/L LZ HAZINESS | 29 | 30 | 25 | 22 | 7/8 |
| 17 | 9659867 | 0.75 | 97 | 118 | 4.30 | 85 | 110 | 5.2 | 1.12 | 0.34 | 161 | 93 | 198 | 7.40 | 2.80 | 413 | 0.00 | ARRHYTHMIA | NORMAL | 30 | 38 | 20 | 22 | 12/14 |
| 18 | 431368 | 1.24 | 38 | 134 | 4.63 | 87 | 315 | 10.6 | 1.12 | 0.44 | 60 | 132 | 229 | 7.40 | 4.10 | 1670 | 0.13 | ARRHYTHMIA | B/L LZ HAZINESS | 37 | 41 | 20 | 22 | 8/9 |
| 19 | 431368 | 0.93 | 49 | 135 | 4.37 | 89 | 208 | 9.6 | 1.12 | 0.50 | 46 | 43 | 126 | 7.40 | 2.50 | 3200 | 0.13 | BBB | B/L LZ HAZINESS | 37 | 41 | 20 | 22 | 8/9 |
| 20 | 643392 | 1.67 | 75 | 138 | 6.31 | 103 | 448 | 10.9 | 1.12 | 0.09 | 46 | 65 | 176 | 7.50 | 41.00 | 1330 | 0.02 | NSR | B/L LZ HAZINESS | 26 | 42 | 20 | 22 | 10/12 |
| 21 | 667293 | 1.10 | 52 | 132 | 3.60 | 96 | 312 | 10.2 | 1.12 | 0.10 | 489 | 925 | 215 | 7.50 | 4.30 | 944 | 1.20 | NSR | B/L LZ HAZINESS | 24 | 38 | 46 | 36 | 13/14 |
| 22 | 667329 | 0.72 | 45 | 140 | 4.39 | 104 | 779 | 13.9 | 1.12 | 0.09 | 12 | 29 | 166 | 7.30 | 3.50 | 1450 | 5.80 | CAD | B/L LZ HAZINESS | 27 | 32 | 20 | 22 | 12/14 |
| 23 | 667822 | 0.72 | 48 | 136 | 5.17 | 100 | 310 | 9.8 | 1.12 | 0.28 | 20 | 20 | 106 | 6.10 | 3.80 | 312 | 0.01 | NSR | NORMAL | 30 | 39 | 20 | 22 | 13/16 |
| 24 | 668650 | 0.79 | 65 | 149 | 6.11 | 101 | 296 | 9.2 | 1.12 | 0.21 | 18 | 21 | 101 | 6.60 | 3.70 | 814 | 0.02 | NSR | B/L LZ HAZINESS | 23 | 39 | 46 | 37 | 13/15 |
| 25 | 295668 | 1.50 | 94 | 131 | 5.10 | 97 | 118 | 8.20 | 0.39 | 0.20 | 14 | 17 | 106 | 6.60 | 3.30 | 276 | 0.03 | ST-T CHANGES | B/L LZ HAZINESS | 29 | 44 | 40 | 39 | 5/6 |
| 26 | 399833 | 1.30 | 28 | 140 | 4.50 | 104 | 102 | NA | 1.12 | 0.18 | 23 | 21 | 113 | 7.50 | 4.40 | 412 | 0.10 | CAD | NORMAL | 29 | 42 | 25 | 22 | 13/14 |
| 27 | 716440 | 0.69 | 54 | 143 | 4.29 | 109 | 99 | NA | 1.12 | 0.23 | 116 | 227 | 178 | 7.00 | 3.70 | 2130 | 0.06 | AV BLOCK | B/L LZ HAZINESS | 23 | 30 | 25 | 22 | 8/9 |
| 28 | 672832 | 1.80 | 104 | 136 | 3.40 | 99 | 208 | 10.20 | 1.12 | 0.09 | 24 | 21 | 106 | 5.80 | 3.20 | 1360 | NA | ST-T CHANGES | B/L LZ HAZINESS | 33 | 44 | 20 | 22 | 9/10 |
| 29 | 673763 | 1.48 | 72 | 124 | 2.38 | 106 | 101 | NA | 1.12 | 0.28 | 94 | 510 | 57 | 7.10 | 3.69 | 708 | NA | NSR | B/L LZ HAZINESS | 28 | 31 | 39 | 36 | 5/8 |
| 30 | 426562 | 1.00 | 38 | 132 | 3.50 | 81 | 98 | NA | 1.12 | 0.25 | 32 | 38 | 96 | 6.20 | 3.34 | 259 | NA | ARRHYTHMIA | NORMAL | 28 | 30 | 20 | 22 | 13/15 |
| 31 | 678677 | 0.83 | 44 | 133 | 3.33 | 85 | 270 | 10.2 | 1.12 | 0.74 | 112 | 62 | 129 | 6.40 | 3.00 | 5000 | 0.06 | ST-T CHANGES | B/L LZ HAZINESS | 24 | 52 | 38 | 35 | 8/9 |
| 32 | 680134 | 1.18 | 53 | 150 | 5.06 | 97 | 105 | NA | 1.12 | 0.11 | 30 | 55 | 160 | 6.90 | 3.49 | 1570 | NA | ST-T CHANGES | B/L LZ HAZINESS | 24 | 42 | 20 | 22 | 10/11 |
| 33 | 170613 | 1.19 | 39 | 122 | 3.06 | 87 | 237 | 9.2 | 1.12 | 0.28 | 40 | 46 | 98 | 6.20 | 2.30 | 1030 | 0.00 | ST-T CHANGES | B/L LZ HAZINESS | 28 | 33 | 20 | 22 | 14/15 |
| 34 | 685690 | 0.50 | 18 | 116 | 4.30 | 84 | 187 | NA | 1.12 | 0.20 | 46 | 54 | 90 | 5.40 | 1.90 | 198 | NA | NSR | NORMAL | 28 | 39 | 20 | 22 | 14/16 |
| 35 | 338758 | 1.10 | 58 | 123 | 4.50 | 89 | 247 | 9.40 | 1.08 | 0.67 | 571 | 107 | 279 | 8.50 | 2.80 | 500 | NA | NSR | B/L LZ HAZINESS | 34 | 43 | 20 | 22 | 13/14 |
| 36 | 641563 | 0.80 | 27 | 142 | 4.70 | 97 | 142 | 10.50 | 1.12 | 0.36 | 18 | 12 | 87 | 7.00 | 3.60 | 814 | 0.06 | CAD | B/L LZ HAZINESS | 26 | 42 | 20 | 22 | 7/8 |
| 37 | 687528 | 0.70 | 31 | 133 | 4.40 | 99 | 418 | 11.3 | 1.12 | 0.29 | 32 | 31 | 90 | 6.60 | 3.20 | 1380 | 0.10 | ST-T CHANGES | B/L LZ HAZINESS | 23 | 31 | 20 | 22 | 8/9 |
| 38 | 310522 | 0.90 | 33 | 140 | 4.30 | 99 | 408 | 11.2 | 1.12 | 0.17 | 78 | 48 | 132 | 6.10 | 3.10 | 400 | 0.10 | ST-T CHANGES | B/L LZ HAZINESS | 28 | 49 | 33 | 29 | 11/13 |
| 39 | 148473 | 0.71 | 32 | 138 | 4.25 | 101 | 108 | NA | 1.12 | 0.30 | 46 | 48 | 96 | 6.40 | 3.10 | 1090 | 0.05 | NSR | B/L LZ HAZINESS | 27 | 49 | 32 | 34 | 9/10 |
| 40 | 690371 | 0.32 | 21 | 134 | 3.85 | 92 | 296 | 9.6 | 1.12 | 0.08 | 17 | 12 | 80 | 6.80 | 3.53 | 522 | 0.01 | NSR | NORMAL | 28 | 43 | 39 | 30 | 9/11 |
| 41 | 692141 | 1.60 | 70 | 137 | 6.70 | 95 | 105 | NA | 1.12 | 0.52 | 1483 | 1215 | 94 | 6.50 | 3.50 | 5000 | NA | ST-T CHANGES | B/L LZ HAZINESS | 22 | 34 | 20 | 22 | 10/12 |
| 42 | 692138 | 1.35 | 36 | 130 | 4.90 | 109 | 589 | 12.10 | 1.12 | 0.10 | 64 | 78 | 198 | 5.80 | 2.00 | 1160 | 0.05 | NSR | B/L LZ HAZINESS | 26 | 36 | 20 | 22 | 16/18 |
| 43 | 691646 | 1.14 | 32 | 129 | 3.92 | 96 | 93 | 7.00 | 1.12 | 0.90 | 12 | 17 | 82 | 6.80 | 2.40 | 882 | NA | NSR | NORMAL | 30 | 46 | 70 | 50 | 10/11 |
| 44 | 690622 | 1.15 | 32 | 135 | 4.47 | 98 | 192 | 8.9 | 1.12 | 0.22 | 25 | 79 | 74 | 7.30 | 4.10 | 1170 | 2.17 | ST-T CHANGES | B/L LZ HAZINESS | 24 | 35 | 20 | 22 | 7/10 |
| 45 | 693144 | 0.80 | 25 | 131 | 3.67 | 97 | 321 | 12.7 | 1.12 | 0.30 | 22 | 13 | 191 | 5.40 | 2.70 | 171 | NA | NSR | NORMAL | 25 | 50 | 20 | 22 | 10/12 |
| 46 | 311305 | 1.80 | 47 | 135 | 4.10 | 95 | 94 | NA | 1.12 | 1.87 | 15 | 29 | 94 | 6.80 | 3.50 | 1820 | 0.04 | BBB | B/L LZ HAZINESS | 27 | 42 | 20 | 22 | 14/18 |
| 47 | 693491 | 1.01 | 43 | 134 | 4.80 | 89 | 120 | 8.3 | 1.12 | 0.30 | 12 | 20 | 93 | 7.40 | 3.80 | 408 | 0.03 | ARRHYTHMIA | B/L LZ HAZINESS | 36 | 33 | 22 | 20 | 9/10 |
| 48 | 233528 | 1.30 | 74 | 138 | 5.80 | 103 | 140 | NA | 1.12 | 0.20 | 46 | 78 | 96 | 6.50 | 2.40 | 269 | 0.05 | NSR | NORMAL | 26 | 42 | 21 | 22 | 10/12 |
| 49 | 256653 | 1.08 | 29 | 139 | 4.23 | 99 | 461 | 12.9 | 1.12 | 0.08 | 21 | 21 | 99 | 8.30 | 4.90 | 594 | 0.02 | LVH | B/L LZ HAZINESS | 32 | 42 | 20 | 22 | 8/12 |
| 50 | 698039 | 0.94 | 27 | 132 | 3.76 | 85 | 500 | 9.7 | 1.12 | 0.14 | 18 | 19 | 52 | 7.80 | 4.20 | 693 | NA | ST-T CHANGES | LEFT PLEURAL EFFUSION | 27 | 41 | 20 | 22 | 9/10 |
| 51 | 699635 | 1.90 | 68 | 137 | 4.50 | 107 | 98 | NA | 1.12 | 0.40 | 38 | 64 | 98 | 6.80 | 2.40 | 378 | NA | ST-T CHANGES | B/L LZ HAZINESS | 26 | 43 | 20 | 22 | 13/14 |
| 52 | 874663 | 1.00 | 33 | 136 | 3.50 | 103 | 154 | NA | 1.12 | 0.48 | 34 | 104 | 54 | 6.00 | 3.40 | 1043 | 0.80 | NSR | NORMAL | 28 | 43 | 21 | 22 | 12/14 |
| 53 | 631131 | 0.50 | 37 | 128 | 4.87 | 93 | 490 | 12.4 | 1.12 | 0.10 | 33 | 38 | 144 | 6.20 | 3.13 | 1420 | 0.04 | ST-T CHANGES | B/L LZ HAZINESS | 29 | 40 | 20 | 22 | 8/10 |
| 54 | 831254 | 1.30 | 24 | 137 | 4.26 | 100 | 450 | 12.20 | 1.12 | 0.20 | 49 | 45 | 102 | 7.30 | 3.89 | 1900 | 0.07 | ST-T CHANGES | B/L LZ HAZINESS | 33 | 37 | 20 | 22 | 10/12 |
| 55 | 685416 | 1.84 | 70 | 143 | 4.36 | 104 | 309 | 9.80 | 0.38 | 0.18 | 9 | 14 | 78 | 7.20 | 3.40 | 498 | NA | NSR | B/L LZ HAZINESS | 26 | 32 | 20 | 22 | 6/8 |
| 56 | 733066 | 0.82 | 32 | 144 | 4.47 | 98 | 271 | 11.50 | 1.12 | 0.19 | 20 | 19 | 55 | 6.70 | 3.20 | 480 | NA | BBB | B/L LZ HAZINESS | 30 | 39 | 20 | 22 | 12/13 |
| 57 | 369699 | 0.90 | 31 | 133 | 4.60 | 98 | 237 | 8.8 | 1.12 | 0.40 | 22 | 26 | 122 | 7.60 | 4.40 | 430 | 0.01 | ARRHYTHMIA | NORMAL | 28 | 40 | 20 | 22 | 10/12 |
| 58 | 26965 | 1.90 | 91 | 139 | 4.90 | 102 | 162 | 7.10 | 0.17 | 0.09 | 24 | 22 | 148 | 7.10 | 3.90 | 778 | 0.14 | NSR | B/L LZ HAZINESS | 26 | 42 | 20 | 22 | 10/12 |
| 59 | 512618 | 1.02 | 39 | 138 | 4.40 | 101 | 110 | 6.80 | 1.42 | 0.70 | 46 | 44 | 259 | 6.40 | 3.70 | 1370 | 0.02 | BBB | B/L LZ HAZINESS | 25 | 48 | 40 | 42 | 8/9 |
| 60 | 709462 | 1.30 | 80 | 135 | 4.30 | 135 | 286 | 9.4 | 1.12 | 0.40 | 48 | 21 | 86 | 5.70 | 3.10 | 929 | 0.03 | CAD | NORMAL | 24 | 45 | 20 | 22 | 13/15 |
| 61 | 147985 | 1.20 | 82 | 139 | 5.70 | 109 | 168 | 7.20 | 0.46 | 0.17 | 45 | 48 | 106 | 6.80 | 3.50 | 2320 | 0.06 | NSR | B/L LZ HAZINESS | 26 | 49 | 40 | 42 | 8/9 |
| 62 | 704987 | 1.59 | 70 | 147 | 3.80 | 99 | 197 | 6.70 | 0.20 | 0.10 | 50 | 44 | 226 | 6.50 | 3.06 | 1300 | 0.18 | ST-T CHANGES | B/L LZ HAZINESS | 26 | 40 | 20 | 22 | 12/13 |
| 63 | 712258 | 0.79 | 37 | 141 | 3.70 | 104 | 97 | 5.80 | 1.12 | 0.50 | 44 | 45 | 98 | 6.60 | 3.20 | 396 | 0.04 | LVH | NORMAL | 24 | 48 | 25 | 20 | 8/9 |
| 64 | 825364 | 1.40 | 96 | 130 | 4.50 | 109 | 380 | 10.40 | 1.12 | 0.59 | 33 | 21 | 243 | 6.00 | 2.30 | 2100 | NA | ARRHYTHMIA | RT PLEURAL EFFUSION | 29 | 36 | 20 | 22 | 12/14 |
| 65 | 244703 | 1.30 | 59 | 135 | 4.90 | 104 | 230 | 9.1 | 1.12 | 0.30 | 36 | 44 | 231 | 7.00 | 3.50 | 441 | 0.01 | ST-T CHANGES | NORMAL | 27 | 42 | 20 | 22 | 14/18 |
| 66 | 718554 | 1.04 | 43 | 134 | 4.58 | 107 | 97 | NA | 1.12 | 0.35 | 20 | 30 | 117 | 6.70 | 3.70 | 2120 | 0.20 | NSR | LEFT PLEURAL EFFUSION | 25 | 40 | 20 | 22 | 7/8 |
| 67 | 569084 | 0.80 | 14 | 140 | 4.20 | 104 | 122 | NA | 1.12 | 0.30 | 20 | 17 | 118 | 6.10 | 3.60 | 283 | 0.05 | BBB | NORMAL | 27 | 42 | 20 | 22 | 12/14 |
| 68 | 426562 | 1.00 | 38 | 120 | 3.50 | 81 | 161 | NA | 1.12 | 0.50 | 46 | 42 | 87 | 6.20 | 3.20 | 195 | NA | ARRHYTHMIA | B/L LZ HAZINESS | 24 | 45 | 20 | 22 | 10/13 |
| 69 | 725304 | 0.60 | 25 | 141 | 3.80 | 109 | 208 | 7.20 | 0.60 | 0.30 | 42 | 47 | 98 | 6.30 | 2.60 | 442 | 0.03 | NSR | NA | 39 | 40 | 28 | 40 | 10/13 |
| 70 | 727316 | 1.15 | 49 | 135 | 4.80 | 104 | 293 | 6.3 | 1.12 | 0.27 | 36 | 39 | 145 | 7.70 | 3.48 | 2110 | NA | ST-T CHANGES | B/L LZ HAZINESS | 28 | 46 | 20 | 22 | 8/9 |
| 71 | 728685 | 1.01 | 36 | 144 | 4.00 | 104 | 90 | NA | 1.12 | 0.12 | 25 | 40 | 73 | 7.20 | 4.19 | 321 | 0.20 | BBB | NORMAL | 24 | 44 | 20 | 22 | 12/13 |
| 72 | 830529 | 1.90 | 172 | 146 | 4.13 | 105 | 280 | 10.60 | 1.12 | 2.19 | 43 | 67 | 176 | 6.40 | 3.30 | 1620 | NA | BBB | B/L LZ HAZINESS | 28 | 35 | 20 | 22 | 8/10 |
| 73 | 729462 | 1.30 | 41 | 136 | 5.60 | 101 | 195 | 6.80 | 0.87 | 0.39 | 624 | 764 | 105 | 6.50 | 4.00 | 2100 | NA | NSR | NA | 25 | 48 | 46 | 37 | 6/7 |

| Sr. No. | CR/MRD No. | | | | | | | | Treatment Given | | | | | | | | Outcome | | Type of heart failure | Discharged/ Death | Follow up | | | | Readmission within 3 months |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2-D ECHO LVID (D/S) | 2-D ECHO LVPW (D/S) | 2-D ECHO EF (%) | 2-D ECHO FS | 2-D ECHO Associated MR | 2-D ECHO E/A ratio | Ultrasound Abdomen (where available) | | | | | | | | | NYHA Grade | | | | NYHA Grade | | Survival Status | | |
| | | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | Antiplatelets | Statin | Diuretics | ACE-/ARB | CCB | Vasodilator | Mineralcorotocoid Antagonist | Beta Blockers | DOA | DOD | | | At 1 month | At 3 months | At 1 month | At 3 months | |
| 1 | 654320 | 55/41 | 7/9 | 32 | 16 | MILD | 72/119 | NA | Y | Y | Y | Y | N | N | N | Y | 4 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 2 | 647674 | 49/40 | 10/11 | 35 | 18 | MILD | 90/84 | B/L PLEURAL EFFUSION | Y | Y | Y | Y | N | N | Y | N | 2 | 2 | CAD | DISHCARGED | 2 | 3 | ALIVE | ALIVE | N |
| 3 | 290146 | 48/34 | 9/12 | 38 | 19 | MILD | 74/74 | NORMAL | Y | Y | Y | N | N | Y | N | N | 3 | 2 | CAD | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 4 | 218767 | 58/42 | 10/11 | 22 | 14 | MILD | NA | NA | Y | Y | Y | N | N | N | N | N | 4 | NA | CAD | DEATH | NA | NA | DEAD | DEAD | N |
| 5 | 651673 | 44/33 | 10/12 | 36 | 18 | MILD | 128/131 | NA | N | Y | Y | Y | N | N | N | N | 3 | 1 | CAD | DISCHARGED | 1 | 2 | ALIVE | ALIVE | N |
| 6 | 151405 | 67/54 | 7/9 | 30 | 15 | MODERATE | NA | NA | Y | Y | Y | N | N | N | N | N | 4 | 2 | CAD | DISCHARGED | 2 | 2 | ALIVE | ALIVE | N |
| 7 | 651681 | 38/28 | 14/16 | 50 | 25 | NO | 68/90 | NORMAL | Y | Y | Y | N | N | N | N | N | 2 | 1 | HFnEF | DISHCARGED | 1 | NA | ALIVE | DEAD | N |
| 8 | 310451 | 25/23 | 13/14 | 60 | 30 | MILD | NA | NA | Y | Y | Y | N | N | Y | N | N | 3 | 2 | CAD | DISHCARGED | 2 | 1 | ALIVE | ALIVE | N |
| 9 | 651414 | 49/38 | 10/12 | 34 | 16 | MILD | 90/79 | RENAL PARENCHYMAL CHANGES | Y | Y | Y | N | N | Y | N | Y | 4 | 2 | CAD | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 10 | 548416 | 34/25 | 8/10 | 38 | 20 | NO | NA | NA | Y | Y | Y | N | N | N | Y | Y | 2 | 2 | CAD | DAMA | NA | NA | ALIVE | ALIVE | N |
| 11 | 654294 | 37/25 | 11/12 | 60 | 30 | NO | 63/90 | NORMAL | Y | Y | Y | N | N | N | N | N | 2 | 1 | CAD | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 12 | 654311 | 58/45 | 10/11 | 38 | 20 | MILD | NA | NA | Y | Y | Y | N | N | N | N | N | 4 | 3 | CAD | DAMA | NA | NA | DEAD | DEAD | N |
| 13 | 624092 | 46/28 | 13/15 | 60 | 30 | NO | NA | NA | Y | Y | Y | Y | N | N | N | N | 3 | 1 | HFnEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 14 | 655530 | 52/40 | 13/15 | 42 | 21 | MODERATE | NA | NA | Y | Y | Y | Y | N | N | N | N | 3 | 2 | CAD | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 15 | 657232 | 47/34 | 14/16 | 60 | 30 | NO | 124/108 | NORMAL | Y | Y | Y | Y | Y | N | Y | N | 3 | 2 | HFnEF | DISHCARGED | 2 | 1 | ALIVE | ALIVE | N |
| 16 | 837915 | 58/49 | 6/7 | 20 | 10 | NO | 80/79 | NA | Y | Y | Y | Y | N | N | N | N | 3 | 1 | HFrEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 17 | 9659867 | 42/29 | 12/14 | 60 | 30 | MILD | 71/80 | NORMAL | Y | Y | Y | N | N | N | Y | N | 2 | 2 | HFnEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 18 | 431368 | 41/34 | 9/11 | 28 | 14 | MODERATE | NA | NA | Y | Y | Y | N | N | N | N | N | 4 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 19 | 431368 | 41/34 | 9/11 | 28 | 14 | MODERATE | NA | NA | Y | Y | Y | N | N | Y | N | N | 3 | 2 | CAD | DISHCARGED | 1 | 2 | ALIVE | ALIVE | Y |
| 20 | 643392 | 54/49 | 9/10 | 22 | 11 | MILD | 45/61 | NORMAL | Y | Y | Y | N | N | N | N | Y | 4 | 2 | CAD | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 21 | 667293 | 56/42 | 13/14 | 45 | 22 | MODERATE | NA | NA | Y | Y | Y | N | N | Y | Y | N | 3 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 22 | 667329 | 36/23 | 12/14 | 60 | 30 | NO | 73/77 | NA | Y | Y | Y | N | N | Y | N | N | 4 | 1 | HFnEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 23 | 667822 | 57/44 | 9/10 | 40 | 20 | NO | NA | NA | Y | Y | Y | N | N | N | N | Y | 2 | 1 | CAD | DISHCARGED | 2 | 1 | ALIVE | ALIVE | N |
| 24 | 668650 | 54/40 | 13/15 | 45 | 23 | MILD | NA | B/L PLEURAL EFFUSION | Y | Y | Y | N | N | N | Y | Y | 3 | 1 | HFnEF | DISHCARGED | 1 | 2 | ALIVE | ALIVE | Y |
| 25 | 295668 | 69/60 | 8/10 | 28 | 14 | MODERATE | 84/100 | NA | Y | Y | Y | N | N | Y | N | N | 3 | 2 | CAD | DISHCARGED | 3 | 4 | ALIVE | ALIVE | Y |
| 26 | 399833 | 52/40 | 13/16 | 45 | 22 | MODERATE | NA | NA | Y | Y | Y | Y | N | Y | N | N | 2 | 1 | CAD | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 27 | 716440 | 43/35 | 8/10 | 32 | 16 | NO | 78/132 | B/L PLEURAL EFFUSION | Y | Y | Y | Y | N | Y | N | N | 4 | 2 | HFrEF | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 28 | 672832 | 51/41 | 8/9 | 36 | 18 | MILD | 84/114 | NA | Y | Y | Y | N | N | N | N | N | 4 | NA | CAD | DEATH | NA | NA | DEAD | DEAD | N |
| 29 | 673763 | 55/44 | 8/10 | 37 | NA | MODERATE | NA | NA | Y | Y | Y | N | N | N | N | Y | 3 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 30 | 426562 | 45/31 | 31/13 | 60 | 30 | NO | NA | NA | N | N | Y | N | N | N | Y | N | 3 | 2 | HFnEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 31 | 678677 | 89/82 | 9/11 | 18 | 10 | MODERATE | NA | B/L PLEURAL EFFUSION | Y | Y | Y | N | N | N | N | N | 3 | 2 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 32 | 680134 | 43/33 | 8/9 | 50 | 20 | NO | 80/41 | NA | Y | Y | Y | N | N | N | N | Y | 4 | 2 | HFnEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 33 | 170613 | 40/30 | 14/15 | 48 | 24 | NO | NA | NA | Y | Y | Y | N | N | Y | Y | N | 3 | 2 | CAD | DISHCARGED | 2 | NA | ALIVE | DEAD | N |
| 34 | 685690 | 48/32 | 14/15 | 60 | 30 | NO | 65/96 | NORMAL | Y | Y | Y | Y | Y | N | N | N | 2 | 1 | HFnEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 35 | 338758 | 55/42 | 7/9 | 44 | 22 | MILD | NA | NA | Y | Y | Y | Y | N | N | N | N | 3 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 36 | 641563 | 54/43 | 11/12 | 36 | 18 | NO | NA | B/L PLEURAL EFFUSION | Y | Y | Y | Y | N | N | N | N | 3 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 37 | 687528 | 56/49 | 9/10 | 33 | 17 | NO | 79/62 | HEPATOMEGALY, FATTY LIVER | Y | Y | Y | Y | N | Y | Y | Y | 3 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | Y |
| 38 | 310522 | 59/51 | 7/8 | 32 | 16 | MODERATE | NA | NA | Y | Y | Y | Y | N | N | Y | Y | 4 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 39 | 148473 | 65/57 | 9/10 | 18 | 9 | MODERATE | NA | NA | Y | Y | Y | N | N | N | N | N | 4 | 2 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 40 | 690371 | 44/30 | 10/11 | 60 | 30 | NO | NA | NA | Y | Y | Y | N | N | N | Y | Y | 2 | 1 | HFnEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 41 | 692141 | 38/26 | 8/10 | 60 | 30 | NO | 85/97 | B/L PLEURAL EFFUSION | Y | Y | Y | N | N | N | N | Y | 3 | 2 | HFnEF | DISHCARGED | 2 | 1 | ALIVE | ALIVE | N |
| 42 | 692138 | 42/26 | 16/17 | 55 | 28 | NO | 132/58 | NORMAL | Y | Y | Y | N | N | N | N | N | 2 | 1 | HFnEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 43 | 691646 | 83/75 | 8/9 | 24 | 12 | SEVERE | 92/70 | NORMAL | Y | Y | Y | N | N | N | Y | N | 3 | 2 | HFrEF | DISHCARGED | 1 | 2 | ALIVE | ALIVE | Y |
| 44 | 690622 | 60/45 | 13/15 | 35 | 18 | NO | NA | NA | Y | Y | Y | N | N | Y | Y | N | 4 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 45 | 693144 | 48/32 | 10/12 | 60 | 30 | NO | NA | NA | Y | Y | Y | N | Y | N | N | N | 3 | 2 | HFnEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | Y |
| 46 | 311305 | 49/32 | 14/15 | 60 | 30 | MILD | 142/122 | NA | N | N | Y | N | N | Y | N | N | 4 | 2 | HFnEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 47 | 693491 | 65/45 | 10/11 | 34 | 17 | NO | 114/103 | ASCITES | Y | Y | Y | Y | N | Y | N | N | 3 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 48 | 233528 | 39/24 | 10/12 | 60 | 30 | NO | NA | NA | Y | Y | Y | Y | N | N | N | N | 3 | 1 | HFnEF | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 49 | 256653 | 68/54 | 10/12 | 20 | 10 | MILD | 82/91 | HEPATOMEGALY, FATTY LIVER | Y | Y | Y | Y | N | N | N | N | 4 | 2 | HFrEF | DISHCARGED | 2 | 1 | ALIVE | ALIVE | N |
| 50 | 698039 | 44/36 | 10/11 | 36 | 18 | NO | 109/117 | HEPATOMEGALY, FATTY LIVER | Y | Y | Y | N | N | Y | N | Y | 3 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 51 | 699635 | 49/40 | 13/14 | 38 | 19 | NO | 35/107 | NA | Y | Y | Y | N | N | N | Y | N | 3 | 2 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 52 | 874663 | 38/24 | 12/14 | 60 | 30 | NO | 66/90 | B/L PLEURAL EFFUSION | Y | Y | Y | Y | N | N | N | N | 4 | 2 | HFnEF | DISHCARGED | 3 | 3 | ALIVE | ALIVE | N |
| 53 | 631131 | 61/44 | 10/12 | 30 | 15 | MILD | 81/79 | NA | Y | Y | Y | Y | N | Y | N | N | 4 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 54 | 831254 | 85/56 | 10/12 | 30 | 15 | MILD | 75/61 | RIGHT PLEURAL EFFUSION | Y | Y | Y | Y | N | N | Y | N | 4 | 2 | HFrEF | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 55 | 685416 | 59/50 | 7/8 | 32 | 16 | MILD | NA | NA | Y | Y | Y | Y | N | N | N | N | 4 | 2 | CAD | DISHCARGED | 2 | NA | ALIVE | DEAD | N |
| 56 | 733066 | 56/37 | 10/11 | 38 | 19 | MILD | 114/30 | NORMAL | Y | Y | Y | N | N | N | N | N | 4 | 2 | CAD | DISCHARGED | 2 | 3 | ALIVE | ALIVE | N |
| 57 | 369699 | 48/32 | 12/14 | 60 | 30 | NO | NA | NA | Y | Y | Y | Y | N | N | N | N | 2 | 1 | HFnEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | Y |
| 58 | 26965 | 44/33 | 10/12 | 36 | 18 | MILD | NA | NA | Y | Y | Y | N | N | N | N | N | 3 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 59 | 512618 | 66/58 | 13/14 | 26 | 13 | MODERATE | NA | NORMAL | Y | Y | Y | Y | N | Y | N | N | 3 | 2 | CAD | DISHCARGED | 1 | 2 | ALIVE | ALIVE | Y |
| 60 | 709462 | 50/34 | 13/16 | 60 | 30 | MILD | 81/121 | NA | Y | Y | Y | Y | N | N | N | Y | 3 | 2 | HFnEF | DISHCARGED | 3 | 2 | ALIVE | ALIVE | N |
| 61 | 147985 | 66/57 | 13/14 | 28 | 14 | MODERATE | NA | NA | Y | Y | Y | N | N | Y | N | N | 4 | 2 | CAD | DISHCARGED | NA | NA | DEAD | DEAD | Y |
| 62 | 704987 | 48/37 | 10/12 | 32 | 16 | MILD | 95/73 | HEPATOMEGALY, FATTY LIVER | Y | Y | Y | Y | N | N | N | N | 3 | 2 | CAD | DISHCARGED | 1 | 2 | ALIVE | ALIVE | N |
| 63 | 712258 | 48/42 | 9/10 | 29 | 15 | NO | NA | NA | Y | Y | Y | Y | N | N | N | Y | 4 | 2 | CAD | DISHCARGED | 2 | 4 | ALIVE | ALIVE | N |
| 64 | 825364 | 48/39 | 12/15 | 40 | 15 | NO | 75/36 | NORMAL | N | Y | Y | N | N | Y | N | Y | 4 | 2 | HFrEF | DISHCARGED | 1 | 2 | ALIVE | ALIVE | N |
| 65 | 244703 | 49/32 | 14/15 | 60 | 30 | MILD | 142/122 | NA | Y | Y | Y | Y | N | N | N | N | 3 | 1 | HFnEF | DISHCARGED | 3 | 1 | ALIVE | ALIVE | Y |
| 66 | 718554 | 49/41 | 10/12 | 24 | 12 | NO | NA | NA | Y | Y | Y | N | N | Y | N | N | 4 | 2 | CAD | DISHCARGED | 2 | NA | ALIVE | DEAD | N |
| 67 | 569084 | 38/24 | 12/14 | 60 | 30 | NO | 66/89 | NA | Y | Y | Y | N | Y | Y | N | N | 4 | 2 | HFnEF | DISCHARGED | 2 | 2 | ALIVE | ALIVE | N |
| 68 | 426562 | 41/29 | 10/12 | 60 | 30 | NO | NA | NA | N | N | Y | N | Y | N | N | N | 2 | 1 | HFnEF | DISHCARGED | 1 | 2 | ALIVE | ALIVE | N |
| 69 | 725304 | 64/55 | 12/13 | 30 | 15 | MODERATE | 86/95 | NORMAL | Y | Y | Y | Y | N | N | N | N | 3 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 70 | 727316 | 48/40 | 9/10 | 34 | 17 | MILD | **NA** | NA | Y | Y | Y | Y | N | Y | Y | N | 3 | 2 | CAD | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 71 | 728685 | 52/41 | 13/14 | 36 | 18 | NO | NA | NA | Y | Y | Y | Y | N | N | N | Y | 3 | 2 | CAD | DISHCARGED | 2 | 3 | ALIVE | ALIVE | N |
| 72 | 830529 | 51/42 | 11/12 | 38 | 20 | MILD | 101/71 | NA | Y | Y | Y | N | N | N | Y | N | 2 | 1 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 73 | 729462 | 66/58 | 7/8 | 16 | 8 | MODERATE | NA | NA | Y | Y | Y | Y | N | N | N | N | 4 | 2 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |

| Sr. No. | CR/MRD No. | Identification Data | | | | | Presenting Complaints | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Drug | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Name | Age | Sex | DOA | DOD | Breathlessness | | Feet swelling | | Palpitation | | Fatigue | | Syncope | | Chest Pain | | Orthopnea | | PND | | Fever | | Surgical stress | | DM-2 | | Any other comorbidity | | | | | | | | | | |
| | | | | | | | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | Y/N | Duration | HTN | Hypothyroidism | Hyperthyroidism | ACE-I/ ARBs | CCBs | | | | | | |
| 74 | 730032 | PK | 55 | M | 16-May-19 | 10-Jun-19 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | Y | 2 | Y | 2 | N | 0 | N | 0 | Y | 4 | N | N | N | N | N | | | | | | |
| 75 | 176524 | RD | 66 | M | 18-May-19 | 23-May-19 | Y | 5 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 8 | N | N | N | N | N | | | | | | |
| 76 | 277217 | GS | 74 | M | 20-May-19 | 22-May-19 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 2 | Y | 2 | Y | 1 | N | 0 | Y | 12 | Y | N | N | N | Y | | | | | | |
| 77 | 733905 | SV | 69 | M | 22-May-19 | 4-Jun-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 78 | 734345 | SS | 64 | M | 23-May-19 | 26-May-19 | Y | 3 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 2 | N | N | N | N | N | | | | | | |
| 79 | 39225 | RR | 59 | F | 24-May-19 | 6-Jun-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 20 | N | 0 | N | 0 | Y | 20 | N | 0 | Y | 20 | N | N | N | N | N | | | | | | |
| 80 | 380805 | AS | 84 | M | 31-May-19 | 10-Jun-19 | Y | 30 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 12 | Y | N | N | Y | N | | | | | | |
| 81 | 739064 | MD | 62 | F | 31-May-19 | 24-Jun-19 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 7 | N | 0 | Y | 2 | Y | N | N | Y | N | | | | | | |
| 82 | 380805 | AS | 84 | M | 31-May-19 | 7-Jun-19 | Y | 10 | N | 0 | N | 0 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 33 | Y | N | N | Y | N | | | | | | |
| 83 | 741314 | SK | 80 | F | 3-Jun-19 | 7-Jun-19 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | | | | | |
| 84 | 69779 | SR | 60 | F | 4-Jun-19 | 7-Jun-19 | Y | 5 | Y | 10 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 5 | N | Y | N | N | N | | | | | | |
| 85 | 500731 | SD | 75 | F | 4-Jun-19 | 30-Jun-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | Y | N | | | | | | |
| 86 | 742237 | SK | 55 | F | 5-Jun-19 | 25-Jun-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 87 | 743429 | BS | 65 | M | 6-Jun-19 | 28-Jun-19 | Y | 7 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 7 | N | 0 | Y | 6 | N | N | N | N | N | | | | | | |
| 88 | 735987 | TS | 65 | M | 8-Jun-19 | 20-Jun-19 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 89 | 745943 | JS | 50 | M | 11-Jun-19 | 30-Jun-19 | Y | 15 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 15 | Y | 15 | N | 0 | N | 0 | Y | 7 | N | N | N | N | N | | | | | | |
| 90 | 750558 | CS | 55 | M | 19-Jun-19 | 25-Jun-19 | Y | 3 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | Y | N | N | N | Y | | | | | | |
| 91 | 752143 | HK | 55 | F | 21-Jun-19 | 24-Jun-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 9 | N | N | N | N | N | | | | | | |
| 92 | 749801 | KS | 75 | M | 21-Jun-19 | 23-Jun-19 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | | | | | |
| 93 | 643615 | KK | 81 | F | 21-Jun-19 | 26-Jun-19 | Y | 5 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 10 | Y | N | Y | N | N | | | | | | |
| 94 | 755270 | GR | 55 | F | 26-Jun-19 | 30-Jun-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 5 | Y | N | N | N | Y | | | | | | |
| 95 | 676539 | BR | 90 | F | 26-Jun-19 | 2-Jul-19 | Y | 6 | N | 0 | N | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | Y | N | | | | | | |
| 96 | 756020 | KG | 82 | M | 27-Jun-19 | 15-Jul-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | | | | | |
| 97 | 759692 | HK | 50 | F | 2-Jul-19 | 9-Jul-19 | Y | 7 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 7 | Y | 7 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 98 | 759773 | AS | 70 | M | 3-Jul-19 | 10-Jul-19 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 3 | N | 0 | N | 0 | Y | N | N | N | Y | | | | | | |
| 99 | 249388 | KJ | 65 | F | 3-Jul-19 | 24-Jul-19 | Y | 60 | Y | 2 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 100 | 764271 | SR | 54 | F | 9-Jul-19 | 29-Jul-19 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 5 | Y | 5 | Y | 1 | Y | N | N | N | Y | | | | | | |
| 101 | 709372 | RR | 62 | F | 12-Jul-19 | 21-Jul-19 | Y | 3 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | Y | 7 | N | N | N | N | N | | | | | | |
| 102 | 712258 | MS | 37 | M | 15-Jul-19 | 21-Jul-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 103 | 252242 | PK | 88 | F | 20-Jul-19 | 23-Jul-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | Y | N | | | | | | |
| 104 | 771882 | GK | 62 | M | 21-Jul-19 | 29-Jul-19 | Y | 3 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 15 | N | 0 | N | 0 | Y | N | N | Y | N | | | | | | |
| 105 | 588257 | MK | 75 | F | 22-Jul-19 | 27-Jul-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | | | | | |
| 106 | 772865 | KS | 72 | M | 23-Jul-19 | 29-Jul-19 | Y | 120 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 120 | Y | 120 | N | 0 | N | 0 | Y | 12 | N | N | N | N | N | | | | | | |
| 107 | 397063 | CK | 74 | F | 27-Jul-19 | 2-Aug-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | Y | N | Y | Y | | | | | | |
| 108 | 776546 | SS | 50 | M | 27-Jul-19 | 30-Jul-19 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 109 | 778417 | RL | 62 | M | 30-Jul-19 | 12-Aug-19 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 2 | Y | N | N | Y | N | | | | | | |
| 110 | 778540 | AL | 57 | M | 31-Jul-19 | 6-Aug-19 | Y | 15 | Y | 10 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 14 | N | N | N | N | N | | | | | | |
| 111 | 778439 | NR | 50 | F | 31-Jul-19 | 8-Aug-19 | Y | 20 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 5 | N | 0 | N | 0 | N | 0 | Y | 5 | N | N | N | N | N | | | | | | |
| 112 | 319347 | HL | 72 | M | 1-Aug-19 | 15-Aug-19 | Y | 7 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | | | | | |
| 113 | 182472 | SK | 76 | F | 2-Aug-19 | 6-Aug-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 16 | Y | N | N | N | Y | | | | | | |
| 114 | 729350 | SD | 57 | F | 3-Aug-19 | 25-Aug-19 | Y | 10 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 20 | N | N | N | N | N | | | | | | |
| 115 | 206131 | PL | 77 | M | 10-Aug-19 | 18-Aug-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 116 | 788345 | AN | 84 | M | 15-Aug-19 | 17-Aug-19 | Y | 5 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 3 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 117 | 789268 | RL | 87 | M | 16-Aug-19 | 29-Aug-19 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 4 | Y | 4 | Y | 5 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 118 | 509042 | RK | 67 | F | 18-Aug-19 | 22-Aug-19 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 30 | Y | 30 | N | 0 | N | 0 | Y | 12 | N | N | N | N | N | | | | | | |
| 119 | 790213 | LS | 45 | M | 18-Aug-19 | 25-Aug-19 | Y | 3 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 120 | 40899 | BS | 59 | M | 18-Aug-19 | 27-Aug-19 | Y | 7 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 3 | N | 0 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 121 | 509043 | RK | 67 | F | 18-Aug-19 | 22-Aug-19 | Y | 30 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 3 | N | N | N | Y | N | | | | | | |
| 122 | 401918 | GK | 54 | F | 19-Aug-19 | 30-Aug-19 | Y | 14 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 10 | Y | 10 | N | 0 | N | 0 | N | 0 | N | N | N | N | N | | | | | | |
| 123 | 217969 | GS | 61 | M | 20-Aug-19 | 28-Aug-19 | Y | 30 | Y | 10 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | N | N | N | N | | | | | | |
| 124 | 833152 | HC | 70 | M | 20-Aug-19 | 28-Aug-19 | Y | 2 | N | 0 | N | 0 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | | | | | |
| 125 | 164770 | VJ | 51 | F | 27-Aug-19 | 2-Sep-19 | Y | 30 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 12 | Y | Y | N | N | Y | | | | | | |
| 126 | 733061 | DS | 71 | M | 30-Aug-19 | 6-Sep-19 | Y | 15 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 10 | Y | 10 | N | 0 | N | 0 | Y | 5 | Y | N | N | N | Y | | | | | | |
| 127 | 176249 | KC | 59 | F | 31-Aug-19 | 6-Sep-19 | Y | 1 | Y | 10 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 10 | Y | N | N | Y | N | | | | | | |
| 128 | 874614 | DK | 70 | M | 31-Aug-19 | 4-Sep-19 | Y | **7** | N | **0** | Y | **1** | N | 0 | N | 0 | N | **0** | N | **0** | N | **0** | N | **0** | N | **0** | Y | 4 | Y | **N** | **N** | N | **Y** | | | | | | |
| 129 | 200876 | NK | 62 | F | 4-Sep-19 | 15-Sep-19 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 3 | N | 0 | Y | 10 | N | N | N | N | N | | | | | | |
| 130 | 740889 | AK | 70 | F | 4-Sep-19 | 9-Sep-19 | Y | 1 | Y | 4 | N | 0 | Y | 15 | N | 0 | N | 0 | Y | 1 | Y | 1 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | | | | | |
| 131 | 806420 | SR | 72 | F | 9-Sep-19 | 14-Sep-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | | | | | |
| 132 | 713178 | RP | 66 | M | 11-Sep-19 | 12-Sep-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 6 | Y | N | N | Y | N | | | | | | |
| 133 | 809725 | SM | 75 | F | 14-Sep-19 | 18-Sep-19 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 1 | N | N | N | N | N | | | | | | |
| 134 | 772330 | KD | 69 | F | 16-Sep-19 | 1-Oct-19 | Y | 7 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | 7 | Y | 7 | N | 0 | N | 0 | Y | 8 | Y | N | N | N | Y | | | | | | |
| 135 | 811507 | AK | 69 | M | 16-Sep-19 | 18-Sep-19 | Y | 1 | N | 0 | N | 0 | Y | 2 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | N | N | N | Y | | | | | | |
| 136 | 872358 | SK | 67 | F | 18-Sep-19 | 21-Sep-19 | Y | 2 | Y | 4 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | N | 0 | Y | Y | N | N | Y | | | | | | |

| Sr. No. | CR/MRD No. | History | | Personal History | | | Family History | General Physical Examination | | | | | | | | | | Systemic Examination | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Alcohol | I/V drug abuse | Smoking | Family h/o DM-2 | Pulse | SBP | DBP | RR | SPO2 | BMI | Pallor | Cyanosis | Clubbing | Edema | JVP | CVS | | Respiratory System | Abdomen | | Hemoglobin (gm/dl) | TLC (x $10^3$/mm$^3$) | N/L/M/E/B (%) | Patelet Count (x $10^3$/mm$^3$) | MCV (fl) | MCH (pg) | MCHC (%) | ESR |
| | | Thyroxine | NMZ | | | | | | | | | | | | | | | S1 | S2 | Pulmonary Rales | Hepatomegaly | Splenomegaly | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm |
| 74 | 730032 | N | N | Y | N | N | N | 98 | 110 | 70 | 22 | 98 | 27 | A | A | A | A | A | P | P | P | A | A | 12.60 | 11.10 | 87.4/8/4/0/0 | 150 | 87.90 | 29.20 | 33.20 | 18.00 |
| 75 | 176524 | N | N | Y | N | N | Y | 98 | 110 | 70 | 22 | 96 | 22 | A | A | A | P | P | P | P | P | A | A | 9.60 | 8.90 | 63/18.7/10/7.6/0 | 220 | 84.30 | 26.40 | 31.30 | 29.00 |
| 76 | 277217 | N | N | N | N | N | Y | 76 | 140 | 90 | 20 | 98 | 28 | A | A | A | A | A | P | P | P | A | A | 11.40 | 12.90 | 81/11/7/1/0 | 136 | 90.00 | 28.00 | 32.00 | 20.00 |
| 77 | 733905 | N | N | N | N | N | Y | 108 | 100 | 70 | 22 | 97 | 24.9 | A | A | A | A | A | P | P | P | A | A | 11.60 | 9.00 | 71/15/11/2/0 | 178 | 83.80 | 27.50 | 32.80 | 8.00 |
| 78 | 734345 | N | N | Y | N | N | Y | 60 | 110 | 90 | 18 | 98 | 28.1 | A | A | A | A | P | P | P | P | P | A | 13.30 | 11.50 | 54/29/8/8/1 | 257 | 81.30 | 28.00 | 33.00 | 32.00 |
| 79 | 39225 | N | N | Y | N | N | Y | 100 | 110 | 70 | 22 | 96 | 25.9 | A | A | A | A | A | P | P | A | A | A | 6.00 | 7.10 | 63/23/10/2/0 | 60 | 86.50 | 28.90 | 33.40 | 76.00 |
| 80 | 380805 | N | N | N | N | Y | Y | 97 | 110 | 80 | 22 | 98 | 23 | A | A | A | A | P | P | P | A | A | A | 7.20 | 7.50 | 82/8.5/8/0/1 | 254 | 66.50 | 21.00 | 31.60 | 16.00 |
| 81 | 739064 | N | N | Y | N | N | N | 66 | 130 | 70 | 22 | 96 | 21.4 | P | A | A | A | A | P | P | A | A | A | 7.10 | 8.40 | 57/32/9/1/0/0 | 314 | 79.90 | 25.50 | 32.00 | 130.00 |
| 82 | 380805 | N | N | N | N | N | Y | 96 | 120 | 70 | 24 | 96 | 27.4 | A | A | A | P | A | P | P | P | A | A | 9.00 | 8.00 | 76.6/11.8/7.6/3.2/0.8 | 214 | 75.00 | 24.00 | 31.90 | 34.00 |
| 83 | 741314 | N | N | N | N | N | N | 80 | 150 | 80 | 20 | 96 | 22 | A | A | A | A | A | P | P | P | A | A | 12.30 | 9.20 | 58/32/8/3/0 | 252 | 86.50 | 29.00 | 33.00 | 18.00 |
| 84 | 69779 | Y | N | N | N | N | Y | 100 | 110 | 80 | 18 | 94 | 225 | A | A | A | P | A | P | P | P | A | A | 10.90 | 8.70 | 58/28/10/3/0 | 140 | 84.00 | 27.10 | 32.20 | 32.00 |
| 85 | 500731 | N | N | N | N | N | N | 90 | 110 | 70 | 22 | 96 | 27.68 | P | A | A | A | A | P | P | P | A | A | 9.80 | 17.10 | 80.8/10.7/7.9/0.5/0.1 | 428 | 75.90 | 23.10 | 30.50 | 86.00 |
| 86 | 742237 | N | N | N | N | N | N | 80 | 120 | 80 | 22 | 96 | 20.99 | P | A | A | A | A | P | P | A | A | A | 7.90 | 14.30 | 90.6/5.5/3.5/0.2 | 354 | 58.10 | 17.30 | 29.70 | 43.00 |
| 87 | 743429 | N | N | N | N | N | N | 80 | 120 | 80 | 20 | 94 | 22.2 | A | A | A | A | A | P | P | P | A | A | 14.40 | 33.30 | 88.6/5.1/6/0.2/0.1 | 140 | 85.40 | 28.30 | 33.10 | 66.00 |
| 88 | 735987 | N | N | Y | N | Y | N | 90 | 110 | 70 | 22 | 94 | 28 | A | A | A | A | A | P | P | P | A | A | 6.60 | 22.80 | 79.7/7.8/10.9/1.3/0,3 | 304 | 85.30 | 27.10 | 31.80 | 80.00 |
| 89 | 745943 | N | N | N | N | N | N | 80 | 110 | 70 | 22 | 94 | 24.9 | A | A | A | A | P | P | P | A | A | A | 11.80 | 10.00 | 77/16/6/0/1 | 433 | 70.30 | 21.40 | 30.50 | 69.00 |
| 90 | 750558 | N | N | N | N | N | N | 60 | 140 | 80 | 20 | 90 | 29 | A | A | A | A | A | P | P | P | A | A | 9.40 | 14.40 | 88/10/2/0/1 | 215 | 77.40 | 24.70 | 32.00 | 8.00 |
| 91 | 752143 | N | N | N | N | N | Y | 89 | 130 | 80 | 22 | 98 | 24.2 | A | A | A | A | P | P | P | P | A | A | 8.90 | 8.20 | 88/11/0/1/1 | 222 | 79.00 | 28.00 | 31.00 | 40.00 |
| 92 | 749801 | N | N | Y | N | N | N | 78 | 140 | 70 | 18 | 96 | 22 | A | A | A | A | A | P | P | A | A | A | 8.60 | 9.50 | 64/22/10/4/1 | 180 | 83.00 | 29.00 | 32.00 | 18.00 |
| 93 | 643615 | N | N | N | N | N | Y | 86 | 150 | 100 | 22 | 94 | 23 | A | A | A | P | A | P | P | P | A | A | 9.80 | 15.00 | 90/5/5/0/0 | 287 | 88.70 | 30.00 | 31.60 | 96.00 |
| 94 | 755270 | N | N | N | N | N | N | 74 | 240 | 180 | 22 | 90 | 23.6 | A | A | A | A | A | P | P | P | A | A | 10.90 | 11.70 | 86/8/0/0/1 | 270 | 79.30 | 24.10 | 30.40 | 20.00 |
| 95 | 676539 | N | N | N | N | N | N | 116 | 100 | 70 | 20 | 98 | 23.4 | A | A | A | P | A | P | P | P | A | A | 12.20 | 9.30 | 76/13/9/1.4/0.5 | 121 | 96.00 | 31.90 | 33.30 | 25.00 |
| 96 | 756020 | N | N | Y | N | N | N | 84 | 150 | 80 | 27 | 94 | 22 | A | A | A | A | A | P | P | P | A | A | 10.80 | 9.60 | 50/37/11/2/0 | 217 | 88.00 | 32.00 | 28.00 | 23.00 |
| 97 | 759692 | N | N | N | N | Y | Y | 80 | 110 | 70 | 20 | 98 | 23 | A | A | A | P | A | P | P | P | A | A | 10.80 | 8.50 | 65/27/8/1/0 | 153 | 78.30 | 28.00 | 30.00 | 29.00 |
| 98 | 759773 | N | N | N | N | Y | N | 46 | 120 | 80 | 20 | 94 | 20.5 | A | A | A | A | A | P | P | P | A | A | 10.20 | 6.30 | 66/26/7/1/0 | 167 | 84.50 | 26.90 | 31.80 | 86.00 |
| 99 | 249388 | N | N | N | N | N | N | 55 | 130 | 70 | 20 | 98 | 24 | A | A | A | A | A | P | P | P | A | A | 12.20 | 11.10 | 82/09/09/0 | 242 | 85.50 | 26.00 | 31.20 | 25.00 |
| 100 | 764271 | N | N | N | N | N | N | 105 | 120 | 80 | 24 | 94 | 27.3 | A | A | A | P | A | P | P | P | A | A | 9.70 | 16.70 | 80/13/7/0/0 | 217 | 89.40 | 29.10 | 32.50 | 18.00 |
| 101 | 709372 | N | N | N | N | N | N | 94 | 90 | 60 | 18 | 94 | 17.9 | A | A | A | A | P | P | P | P | A | A | 11.90 | 9.20 | 67/24/8/0/1 | 140 | 89.20 | 29.30 | 32.80 | 19.00 |
| 102 | 712258 | N | N | Y | N | N | N | 148 | 100 | 70 | 20 | 98 | 23.6 | A | A | A | A | P | P | P | P | A | A | 14.00 | 11.60 | 65/28/02/5/0 | 201 | 88.50 | 30.00 | 31.20 | 28.00 |
| 103 | 252242 | N | N | N | N | N | N | 139 | 120 | 90 | 24 | 92 | 23.6 | A | A | A | A | R | P | P | P | A | A | 12.50 | 9.70 | 53/35/5/7/0 | 284 | 86.90 | 28.00 | 31.00 | 30.00 |
| 104 | 771882 | N | N | Y | N | Y | N | 120 | 140 | 70 | 20 | 96 | 24.3 | A | A | A | A | A | P | P | P | P | A | 12.10 | 14.70 | 86.2/7/5.4/1.4 | 471 | 98.40 | 32.00 | 32.50 | 46.00 |
| 105 | 588257 | N | N | N | N | N | N | 80 | 110 | 70 | 20 | 98 | 22.1 | A | A | A | A | A | P | P | A | A | A | 8.90 | 7.70 | 65/18/9/7/0 | 240 | 89.50 | 29.70 | 33.00 | 8.00 |
| 106 | 772865 | N | N | Y | N | N | Y | 120 | 100 | 70 | 14 | 96 | 27.4 | A | A | A | P | A | P | P | P | P | A | 13.00 | 5.70 | 80/13/7/0/1 | 170 | 90.00 | 32.00 | 30.00 | 18.00 |
| 107 | 397063 | N | N | N | N | N | Y | 100 | 140 | 80 | 20 | 98 | 25 | A | A | A | P | A | P | P | A | A | A | 12.50 | 11.90 | 80/14/4/2/0 | 289 | 89.00 | 30.00 | 31.00 | 40.00 |
| 108 | 776546 | N | N | N | N | N | Y | 90 | 130 | 80 | 18 | 98 | 23.2 | A | A | A | A | A | P | P | P | A | A | 14.60 | 10.30 | 88/9/2/1/0 | 140 | 90.00 | 30.00 | 31.00 | 15.00 |
| 109 | 778417 | N | N | N | N | N | Y | 98 | 200 | 120 | 34 | 94 | 26 | A | A | A | A | P | P | P | P | A | A | 13.20 | 10.40 | 59/34/6/0 | 280 | 72.00 | 21.40 | 29.70 | 36.00 |
| 110 | 778540 | N | N | N | N | N | N | 94 | 130 | 80 | 20 | 96 | 24.6 | A | A | A | P | A | P | P | P | A | A | 9.10 | 6.80 | 65/14/10/11/0 | 162 | 86.90 | 28.40 | 32.60 | 37.00 |
| 111 | 778439 | N | N | N | N | N | Y | 117 | 150 | 90 | 27 | 98 | 26.2 | A | A | A | A | P | P | P | P | A | A | 9.80 | 17.10 | 80.8/10.7/7.9/0.5/0.1 | 400 | 75.90 | 23.10 | 28.50 | 86.00 |
| 112 | 319347 | N | N | Y | N | N | Y | 75 | 130 | 80 | 26 | 94 | 28.5 | A | A | A | A | A | P | P | P | A | A | 6.20 | 12.90 | 92.7/5.3/1.9/0/0.1 | 371 | 67.10 | 19.90 | 29.70 | 25.00 |
| 113 | 182472 | N | N | N | N | N | N | 83 | 170 | 80 | 20 | 98 | 33.5 | A | A | A | A | A | P | P | A | A | A | 10.40 | 6.60 | 72/18/6/4/0 | 151 | 78.50 | 26.00 | 28.00 | 29.00 |
| 114 | 729350 | N | N | N | N | N | Y | 99 | 120 | 80 | 20 | 94 | 21.9 | A | A | A | A | A | P | P | P | A | A | 9.30 | 5.80 | 71/21/8/0/0 | 209 | 81.30 | 24.10 | 29.70 | 103.00 |
| 115 | 206131 | N | N | N | N | N | N | 122 | 100 | 70 | 34 | 90 | 20 | A | A | A | A | A | P | P | P | A | A | 12.10 | 16.20 | 84/11/5/1/0 | 174 | 90.00 | 27.70 | 30.80 | 37.00 |
| 116 | 788345 | N | N | Y | N | Y | Y | 108 | 110 | 70 | 20 | 98 | 26.1 | A | A | A | A | A | P | P | P | A | A | 13.70 | 23.40 | 90/93/4/3/0 | 250 | 90.10 | 28.20 | 31.00 | 19.00 |
| 117 | 789268 | N | N | N | N | N | N | 100 | 120 | 80 | 26 | 85 | 23.8 | A | A | A | P | P | P | P | P | A | A | 11.80 | 29.60 | 85/5/3/1/0 | 274 | 103.50 | 32.20 | 31.10 | 40.00 |
| 118 | 509042 | N | N | N | N | N | Y | 86 | 110 | 80 | 18 | 92 | 26.2 | A | A | A | A | A | P | P | P | A | A | 11.90 | 9.20 | 85/9/7/0/1 | 172 | 85.80 | 29.00 | 32.00 | 30.00 |
| 119 | 790213 | N | N | Y | N | N | Y | 109 | 0 | 0 | 28 | 98 | 27.3 | A | A | A | A | A | P | P | A | P | A | 18.20 | 10.30 | 87/8/4/0/1 | 130 | 92.00 | 30.10 | 29.20 | 10.00 |
| 120 | 40899 | N | N | Y | N | N | Y | 96 | 90 | 60 | 18 | 98 | 20.4 | A | A | A | A | A | P | P | A | A | A | 14.40 | 6.30 | 67/22/7/4/0 | 120 | 93.10 | 27.30 | 30.10 | 19.00 |
| 121 | 509043 | N | N | N | N | N | N | 90 | 110 | 70 | 22 | 95 | 24 | A | A | A | P | P | P | P | P | A | A | 10.00 | 5.50 | 80/13/7/0/1 | 138 | 92.00 | 32.00 | 30.20 | 30.00 |
| 122 | 401918 | N | N | N | N | N | N | 94 | 130 | 90 | 28 | 98 | 25.7 | A | A | A | A | A | P | P | P | A | A | 9.90 | 11.90 | 85/13/2/0/0 | 253 | 78.40 | 23.60 | 30.10 | 37.00 |
| 123 | 217969 | N | N | Y | N | N | N | 120 | 130 | 70 | 24 | 97 | 25.6 | A | A | A | P | P | P | P | P | A | A | 8.50 | 10.40 | 87/4/8/1.2/0 | 116 | 87.80 | 28.50 | 32.40 | 24.00 |
| 124 | 833152 | N | N | Y | N | Y | N | 88 | 130 | 70 | 20 | 96 | 24.7 | A | A | A | A | A | P | P | P | A | A | 11.10 | 10.90 | 80.4/11.3/8/0.2/0.1 | 207 | 92.50 | 31.20 | 33.80 | 35.00 |
| 125 | 164770 | Y | N | N | N | N | N | 80 | 80 | 60 | 20 | 98 | 22 | A | A | A | A | A | P | P | A | A | A | 9.20 | 8.80 | 74/18/8/0/1 | 449 | 84.50 | 38.00 | 32.00 | 24.00 |
| 126 | 733061 | N | N | Y | N | N | N | 89 | 0 | 0 | 22 | 90 | 22 | A | A | A | A | A | P | P | P | A | A | 7.20 | 9.60 | 91.7/4.7/3.6/0/0 | 187 | 91.40 | 30.40 | 33.30 | 23.00 |
| 127 | 176249 | N | N | N | N | N | N | 70 | 140 | 80 | 20 | 94 | 30.2 | A | A | A | P | A | P | P | P | P | A | 10.70 | 11.20 | 54/34/8/4/1 | 249 | 79.00 | 24.00 | 29.00 | 56.00 |
| 128 | 874614 | **N** | N | N | N | N | N | 88 | 110 | 70 | 16 | 96 | 25 | A | A | A | A | A | P | P | A | A | A | 15.00 | 15.00 | 66/25/4/5/2 | 400 | 91.70 | 30.80 | 33.60 | 20.00 |
| 129 | 200876 | N | N | N | N | N | N | 76 | 130 | 80 | 18 | 99 | 25.8 | A | A | A | A | P | P | P | A | A | A | 10.00 | 7.00 | 75/0/16/7/0 | 148 | 85.00 | 28.00 | 33.00 | 105.00 |
| 130 | 740889 | N | N | N | N | N | N | 94 | 120 | 80 | 18 | 96 | 22.8 | A | A | A | P | P | P | P | A | A | A | 11.30 | 4.20 | 49/5/33/11/0 | 148 | 74.20 | 29.10 | 32.10 | 92.00 |
| 131 | 806420 | N | N | N | N | N | Y | 60 | 160 | 90 | 20 | 98 | 24.5 | A | A | A | A | A | P | P | P | A | A | 11.20 | 10.10 | 77/16/3/0/0 | 327 | 86.20 | 30.00 | 29.10 | 19.00 |
| 132 | 713178 | N | N | Y | N | N | N | 90 | 120 | 80 | 18 | 94 | 28.1 | A | A | A | A | A | P | P | A | P | A | 9.10 | 5.20 | 86/9/4/1/0 | 206 | 96.90 | 32.80 | 28.10 | 22.00 |
| 133 | 809725 | N | N | N | N | N | Y | 108 | 130 | 70 | 22 | 98 | 22.6 | A | A | A | A | A | P | P | A | A | A | 10.90 | 15.00 | 52/40/8/1/0 | 209 | 79.80 | 32.00 | 29.20 | 18.00 |
| 134 | 772330 | N | N | N | N | N | Y | 86 | 130 | 90 | 20 | 98 | 24.2 | A | A | A | A | A | P | P | P | A | A | 11.30 | 9.00 | 85/14/01/0/0 | 324 | 85.10 | 28.00 | 32.00 | 7.00 |
| 135 | 811507 | N | N | Y | N | N | Y | 86 | 120 | 80 | 20 | 98 | 23.7 | A | A | A | A | A | P | P | P | A | A | 13.50 | 9.90 | 60/10/5/0/0 | 260 | 91.10 | 29.00 | 31.80 | 18.00 |
| 136 | 872358 | Y | N | N | N | N | N | 98 | 130 | 70 | 18 | 94 | 23.5 | A | A | A | P | A | P | P | P | A | A | 6.70 | 27.00 | 90/2/8/0/0 | 432 | 76.10 | 22.50 | 29.60 | 28.00 |

| Sr. No. | CR/MRD No. | Laboratory Investigation | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RFT Creatinine (mg/dl) | RFT Urea (mg/dl) | RFT Sodium (mmol/l) | RFT Potassium (mmol/l) | RFT Chloride (mmol/l) | RBS (mg/dl) | HbA1C | LFT Total bilirubin (mg/dl) | LFT Direct bilirubin (mg/dl) | LFT ALT (u/l) | LFT AST (u/l) | LFT ALP (u/l) | LFT Total protein (g/dl) | LFT Serum albumin (g/dl) | BNP Levels (pg/ml) | Trop-T (ng/ml) Levels (Where available) | ECG | Chest X-RAY | 2-D ECHO AORTIC ROOT | 2-D ECHO LEFT ATRIUM | 2-D ECHO RIGHT ATRIUM | 2-D ECHO RVID (D) | 2-D ECHO IVST (D/S) |
| | | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm |
| 74 | 730032 | 0.87 | 69 | 136 | 3.59 | 99 | 208 | 7.20 | 1.03 | 0.47 | 1635 | 805 | 208 | 5.80 | 3.37 | 1540 | NA | ST-T CHANGES | NORMAL | 26 | 39 | 20 | 22 | 9/10 |
| 75 | 176524 | 1.76 | 89 | 142 | 5.23 | 111 | 180 | 6.90 | 0.43 | 0.12 | 32 | 16 | 91 | 5.80 | 3.37 | 1040 | NA | ST-T CHANGES | B/L LZ HAZINESS | 24 | 44 | 42 | 36 | 5/6 |
| 76 | 277217 | 0.74 | 30 | 111 | 4.70 | 78 | 199 | 10.10 | 0.78 | 0.12 | 21 | 37 | 85 | 6.60 | 3.92 | 499 | 0.23 | AV BLOCK | NORMAL | 35 | 42 | 20 | 22 | 13/16 |
| 77 | 733905 | 0.68 | 29 | 135 | 4.80 | 102 | 108 | NA | 1.12 | 0.42 | 26 | 23 | 70 | 6.40 | 3.90 | 914 | 0.58 | ST-T CHANGES | B/L LZ HAZINESS | 24 | 51 | 22 | 22 | 4/6 |
| 78 | 734345 | 1.69 | 48 | 137 | 4.40 | 105 | 190 | 9.80 | 0.82 | 0.29 | 12 | 11 | 97 | 6.00 | 3.70 | 415 | 0.01 | NSR | NORMAL | 29 | 46 | 20 | 22 | 9/10 |
| 79 | 39225 | 1.36 | 18 | 134 | 4.27 | 101 | 194 | 11.1 | 1.12 | 0.26 | 15 | 9 | 146 | 5.80 | 3.51 | 162 | NA | NSR | NORMAL | 28 | 34 | 20 | 22 | 14/17 |
| 80 | 380805 | 1.40 | 42 | 120 | 4.50 | 87 | 235 | 10.5 | 1.12 | 0.19 | 14 | 20 | 67 | 5.90 | 3.60 | 1400 | 1.43 | ST-T CHANGES | B/L LZ HAZINESS | 35 | 46 | 20 | 22 | 15/17 |
| 81 | 739064 | 0.78 | 17 | 137 | 3.62 | 104 | 128 | 7.1 | 1.12 | 0.10 | 33 | 36 | 98 | 6.40 | 3.50 | 248 | NA | NSR | NORMAL | 22 | 32 | 20 | 22 | 11/12 |
| 82 | 380805 | 1.00 | 45 | | 5.02 | 103 | 364 | 11.10 | 1.12 | 0.20 | 81 | 94 | 126 | 6.10 | 2.40 | 10820 | NA | LVH | B/L LZ HAZINESS | 35 | 46 | 20 | 22 | 15/17 |
| 83 | 741314 | 1.30 | 91 | 136 | 4.30 | 109 | 89 | NA | 1.12 | 0.80 | 52 | 56 | 83 | 6.20 | 2.40 | 804 | 0.00 | BBB | NORMAL | 24 | 45 | 20 | 22 | 10/13 |
| 84 | 69779 | 0.76 | 40 | 138 | 4.20 | 95 | 178 | 10.6 | 1.12 | 0.25 | 19 | 22 | 96 | 6.60 | 3.50 | 336 | NA | NSR | NORMAL | 27 | 34 | 20 | 22 | 10/13 |
| 85 | 500731 | 1.04 | 36 | 141 | 4.72 | 105 | 98 | NA | 1.12 | 0.11 | 17 | 24 | 118 | 6.80 | 3.90 | 1500 | 0.44 | ST-T CHANGES | B/L LZ HAZINESS | 28 | 45 | 20 | 22 | 5/6 |
| 86 | 742237 | 0.75 | 26 | 141 | 3.83 | 104 | 133 | NA | 1.12 | 0.10 | 32 | 24 | 109 | 6.40 | 4.00 | 394 | 0.03 | NSR | NORMAL | 27 | 41 | 20 | 22 | 7/9 |
| 87 | 743429 | 1.80 | 71 | 134 | 3.11 | 97 | 114 | NA | 1.12 | 0.40 | 26 | 24 | 84 | 6.40 | 2.80 | 751 | 0.05 | NSR | B/L LZ HAZINESS | 30 | 38 | 20 | 22 | 8/10 |
| 88 | 735987 | 0.60 | 40 | 138 | 3.52 | 99 | 136 | NA | 1.12 | 0.44 | 17 | 20 | 66 | 4.50 | 2.35 | 280 | NA | NSR | NORMAL | 30 | 39 | 20 | 22 | 13/16 |
| 89 | 745943 | 1.09 | 28 | 136 | 5.26 | 99 | 169 | **10** | 1.12 | 0.14 | 20 | 34 | 89 | 7.70 | 4.17 | 1370 | 0.24 | ST-T CHANGES | B/L LZ HAZINESS | 28 | 34 | 20 | 22 | 4/5 |
| 90 | 750558 | 1.90 | 113 | 134 | 4.09 | 99 | 255 | 7.8 | 1.12 | 0.23 | 118 | 97 | 112 | 6.20 | 4.07 | 1120 | NA | ARRHYTHMIA | B/L LZ HAZINESS | 24 | 53 | 45 | 38 | 12/13 |
| 91 | 752143 | 1.50 | 72 | 136 | 5.20 | 104 | 262 | 7.80 | 0.25 | 0.16 | 31 | 24 | 95 | 7.80 | 4.50 | 4040 | 0.03 | NSR | B/L LZ HAZINESS | 24 | 40 | 20 | 22 | 7/9 |
| 92 | 749801 | 1.30 | 27 | 139 | 4.20 | 103 | 80 | NA | 1.12 | 0.15 | 34 | 34 | 69 | 7.70 | 4.40 | 191 | 0.05 | ST-T CHANGES | NORMAL | 32 | 37 | 20 | 22 | 13/14 |
| 93 | 643615 | 1.00 | 42 | 134 | 4.20 | 98 | 134 | 8.40 | 1.12 | 0.18 | 22 | 30 | 95 | 7.80 | 3.56 | 952 | 0.05 | ST-T CHANGES | NORMAL | 25 | 42 | 20 | 22 | 10/12 |
| 94 | 755270 | 1.04 | 38 | 140 | 3.72 | 95 | 200 | 7.70 | 1.12 | 0.40 | 11 | 21 | 119 | 7.90 | 4.42 | 3580 | 0.05 | ST-T CHANGES | B/L LZ HAZINESS | 28 | 48 | 39 | 37 | 18/20 |
| 95 | 676539 | 1.50 | 61 | 129 | 5.97 | 98 | 120 | NA | 1.12 | 0.09 | 270 | 137 | 201 | 6.50 | 3.60 | 1100 | NA | ARRHYTHMIA | NORMAL | 26 | 47 | 44 | 35 | 10/12 |
| 96 | 756020 | 1.60 | 66 | 135 | 4.19 | 99 | 120 | NA | 1.12 | 0.07 | 104 | 435 | 94 | 6.90 | 3.20 | 900 | 1.20 | ST-T CHANGES | B/L LZ HAZINESS | 33 | 41 | 22 | 22 | 7/9 |
| 97 | 759692 | 0.79 | 58 | 128 | 3.50 | 95 | 150 | 3.90 | 1.12 | 0.30 | 48 | 60 | 79 | 6.40 | 2.20 | 2360 | NA | NSR | B/L LZ HAZINESS | 27 | 42 | 40 | 38 | 9/10 |
| 98 | 759773 | 0.60 | 13 | 127 | 3.70 | 97 | 314 | 5.5 | 1.12 | 0.09 | 24 | 16 | 112 | 6.50 | 2.90 | 400 | 0.01 | ST-T CHANGES | NORMAL | 39 | 34 | 20 | 22 | 12/14 |
| 99 | 249388 | 1.30 | 80 | 136 | 5.10 | 91 | 162 | NA | 1.12 | 0.38 | 20 | 25 | 82 | 7.30 | 3.90 | 2820 | NA | ARRHYTHMIA | B/L LZ HAZINESS | 35 | 46 | 20 | 22 | 15/17 |
| 100 | 764271 | 1.05 | 35 | 133 | 3.60 | 102 | 462 | 18.8 | 1.12 | 0.19 | 19 | 19 | 268 | 5.50 | 2.20 | 1500 | NA | ST-T CHANGES | B/L LZ HAZINESS | 23 | 45 | 25 | 22 | 10/11 |
| 101 | 709372 | 0.90 | 38 | 139 | 3.69 | 102 | 212 | 7.6 | 1.12 | 0.28 | 15 | 34 | 93 | 6.80 | 3.43 | 2640 | 0.01 | ST-T CHANGES | LEFT PLEURAL EFFUSION | 26 | 46 | 48 | 40 | 6/7 |
| 102 | 712258 | 1.04 | 36 | 136 | 3.30 | 102 | 290 | NA | 1.12 | 0.59 | 77 | 57 | 129 | 6.60 | 3.60 | 146 | 1.38 | ST-T CHANGES | NORMAL | 28 | 48 | 46 | 22 | 6/8 |
| 103 | 252242 | 0.80 | 18 | 135 | 3.50 | 96 | 247 | 4.80 | 1.12 | 0.07 | 20 | 31 | 73 | 6.60 | 4.12 | 536 | NA | NSR | RT PLEURAL EFFUSION | 28 | 53 | 20 | 22 | 8/9 |
| 104 | 771882 | 1.10 | 40 | 130 | 4.00 | 110 | 164 | 4.40 | 1.12 | 0.34 | 36 | 43 | 106 | 7.20 | 2.90 | 1030 | NA | LVH | LEFT PLEURAL EFFUSION | 28 | 41 | 22 | 24 | 8/9 |
| 105 | 588257 | 1.06 | 46 | 118 | 5.50 | 85 | 79 | NA | 1.12 | 0.27 | 15 | 19 | 79 | 6.40 | 3.90 | 300 | 0.04 | NSR | NORMAL | 25 | 33 | 20 | 22 | 9/11 |
| 106 | 772865 | 1.43 | 80 | 134 | 4.80 | 97 | 168 | 8.40 | 1.12 | 0.49 | 159 | 178.00 | 118 | 6.30 | 4.00 | 784 | 0.13 | ARRHYTHMIA | B/L LZ HAZINESS | 29 | 43 | 40 | 45 | 8/9 |
| 107 | 397063 | 1.90 | 110 | 135 | 4.50 | 95 | 98 | NA | 1.12 | 0.13 | 16 | 18 | 87 | 7.80 | 4.00 | 1200 | 0.08 | NSR | B/L LZ HAZINESS | 36 | 44 | 20 | 22 | 11/12 |
| 108 | 776546 | 1.16 | 32 | 137 | 4.20 | 99 | 140 | NA | 1.12 | 0.25 | 36 | 73 | 98 | 6.40 | 6.80 | 1440 | 1.30 | CAD | LEFT PLEURAL EFFUSION | 36 | 43 | 20 | 20 | 11/12 |
| 109 | 778417 | 1.05 | 46 | 132 | 4.50 | 90 | 212 | 11.00 | 1.12 | 0.52 | 39 | 37 | 110 | 7.20 | 3.60 | 1280 | 1.10 | LVH | B/L LZ HAZINESS | 33 | 40 | 47 | 46 | 13/16 |
| 110 | 778540 | 1.20 | 70 | 132 | 4.69 | 105 | 210 | 7.6 | 1.12 | 0.39 | 8 | 19 | 91 | 6.70 | 2.16 | 1100 | NA | NSR | B/L LZ HAZINESS | 25 | 20 | 10 | 20 | 10/11 |
| 111 | 778439 | 1.04 | 30 | 130 | 4.72 | 98 | 135 | 9.00 | 1.12 | 0.11 | 17 | 28 | 118 | 6.80 | 3.90 | 900 | 0.44 | NSR | LEFT PLEURAL EFFUSION | 28 | 34 | 20 | 22 | 4/5 |
| 112 | 319347 | 1.29 | 48 | 138 | 4.68 | 106 | NA | NA | 1.12 | 0.15 | 21 | 14 | 63 | 6.60 | 3.90 | 428 | NA | LVH | NORMAL | 33 | 38 | 20 | 22 | 13/14 |
| 113 | 182472 | 0.90 | 35 | 144 | 4.70 | 105 | 169 | 8.4 | 1.12 | 0.20 | 8 | 17 | 96 | 6.40 | 2.80 | 288 | 0.01 | NSR | NORMAL | 28 | 41 | 20 | 22 | 10/12 |
| 114 | 729350 | 0.85 | 54 | 130 | 4.89 | 99 | 248 | 11 | 1.12 | 1.87 | 34 | 52 | 632 | 8.20 | 3.20 | 2150 | NA | ST-T CHANGES | B/L LZ HAZINESS | 27 | 42 | 38 | 35 | 8/9 |
| 115 | 206131 | 1.50 | 57 | 142 | 5.09 | 113 | 123 | NA | 1.12 | 0.48 | 388 | 786 | 345 | 7.30 | 4.20 | 918 | 0.08 | ARRHYTHMIA | B/L LZ HAZINESS | 28 | 48 | 38 | 37 | 6/8 |
| 116 | 788345 | 1.90 | 139 | 159 | 3.20 | 119 | 190 | NA | 1.12 | 0.50 | 49 | 48 | 112 | 6.40 | 2.80 | 480 | NA | ARRHYTHMIA | B/L LZ HAZINESS | 26 | 49 | 20 | 42 | 8/9 |
| 117 | 789268 | 1.30 | 66 | 144 | 4.27 | 113 | 86 | NA | 1.12 | 0.79 | 72 | 118 | 76 | 5.60 | 2.90 | 5000 | 3.95 | ARRHYTHMIA | B/L LZ HAZINESS | 29 | 39 | 20 | 22 | 10/11 |
| 118 | 509042 | 0.80 | 43 | 140 | 4.10 | 101 | 143 | 7.80 | 1.12 | 1.90 | 14 | 23 | 154 | 6.80 | 3.90 | 1560 | 0.02 | BBB | B/L LZ HAZINESS | 29 | 43 | 40 | 46 | 6/9 |
| 119 | 790213 | 1.80 | 120 | 159 | 2.60 | 110 | 128 | NA | 1.12 | 6.86 | 4144 | 6470 | 181 | 6.60 | 4.10 | 1450 | 0.00 | NSR | LEFT PLEURAL EFFUSION | 27 | 30 | 20 | 22 | 7/8 |
| 120 | 40899 | 0.80 | 32 | 135 | 3.90 | 103 | 87 | NA | 1.12 | 1.03 | 27 | 28 | 92 | 7.00 | 4.00 | 3770 | NA | BBB | B/L LZ HAZINESS | 29 | 81 | 52 | 35 | 8/11 |
| 121 | 509043 | 0.80 | 44 | 136 | 3.30 | 100 | 149 | 6.80 | 1.12 | 1.90 | 14 | 23 | 154 | 6.80 | 3.90 | 1560 | 0.02 | NSR | B/L LZ HAZINESS | 29 | 43 | 40 | 46 | 6/9 |
| 122 | 401918 | 0.54 | 34 | 146 | 4.36 | 106 | 134 | NA | 1.12 | 0.26 | 74 | 38 | 185 | 6.60 | 3.90 | 1260 | 0.10 | NSR | B/L LZ HAZINESS | 26 | 49 | 48 | 22 | 6/9 |
| 123 | 217969 | 1.16 | 58 | 133 | 4.47 | 102 | 180 | 8.4 | 1.12 | 0.70 | 31 | 58 | 126 | 5.50 | 3.20 | 1280 | 0.06 | NSR | RT PLEURAL EFFUSION | 29 | 49 | 25 | 20 | 9/10 |
| 124 | 833152 | 1.90 | 38 | 122 | 4.48 | 87 | 220 | 5.80 | 1.12 | 0.07 | 8 | 36 | 91 | 6.50 | 3.30 | 732 | NA | BBB | B/L LZ HAZINESS | 30 | 51 | 20 | 22 | 10/11 |
| 125 | 164770 | 1.80 | 50 | 137 | 4.40 | 102 | 126 | NA | 1.12 | 0.24 | 9 | 16 | 60 | 7.30 | 3.30 | 807 | NA | BBB | NORMAL | 28 | 30 | 20 | 22 | 13/15 |
| 126 | 733061 | 1.89 | 96 | 128 | 4.60 | 92 | 132 | NA | 1.12 | 0.57 | 20 | 24 | 95 | 7.80 | 4.46 | 2170 | 0.05 | NSR | B/L LZ HAZINESS | 26 | 48 | 32 | 32 | 9/11 |
| 127 | 176249 | 0.60 | 27 | 132 | 4.40 | 98 | 310 | 10.5 | 1.12 | 0.10 | 46 | 44 | 96 | 6.80 | 2.40 | 235 | 0.01 | ST-T CHANGES | LEFT PLEURAL EFFUSION | 30 | 38 | 20 | 22 | 13/15 |
| 128 | 874614 | 1.00 | 38 | 135 | 4.20 | 99 | 168 | 9.40 | 1.12 | 0.30 | 49 | 46 | 120 | 6.40 | 2.50 | 407 | NA | LVH | NORMAL | 27 | 42 | 21 | 24 | 13/15 |
| 129 | 200876 | 1.60 | 66 | 136 | 3.50 | 104 | 212 | 8.00 | 1.12 | 0.52 | 43 | 56 | 98 | 6.30 | 3.30 | 2340 | 0.50 | BBB | B/L LZ HAZINESS | 35 | 33 | 20 | 22 | 13/15 |
| 130 | 740889 | 1.40 | 58 | 139 | 4.70 | 107 | 105 | NA | 1.12 | 0.20 | 96 | 99 | 119 | 6.30 | 2.40 | 922 | 0.01 | BBB | B/L LZ HAZINESS | 26 | 49 | 48 | 22 | 6/9 |
| 131 | 806420 | 1.00 | 30 | 133 | 4.00 | 102 | 163 | NA | 1.12 | 0.60 | 38 | 33 | 120 | 7.20 | 4.60 | 375 | 0.02 | ST-T CHANGES | NORMAL | 26 | 45 | 25 | 20 | 13/14 |
| 132 | 713178 | 1.60 | 47 | 136 | 5.00 | 106 | 99 | 6.30 | 1.12 | 0.29 | 29 | 32 | 110 | 6.00 | 3.50 | 5000 | 0.07 | BBB | B/L LZ HAZINESS | 33 | 40 | 47 | 46 | 13/16 |
| 133 | 809725 | 1.20 | 31 | 140 | 4.40 | 106 | 273 | 8.40 | 1.12 | 0.16 | 11 | 18 | 98 | 6.70 | 3.30 | 1850 | 0.02 | BBB | B/L LZ HAZINESS | 24 | 48 | 25 | 20 | 8/9 |
| 134 | 772330 | 1.30 | 36 | 140 | 5.40 | 107 | 250 | 9.40 | 1.12 | 0.60 | 23 | 19 | 68 | 7.60 | 3.40 | 3230 | 0.06 | ST-T CHANGES | B/L LZ HAZINESS | 26 | 42 | 20 | 22 | 6/7 |
| 135 | 811507 | 1.16 | 50 | 138 | 5.06 | 106 | 98 | NA | 1.12 | 0.40 | 38 | 32 | 96 | 6.70 | 3.20 | 1290 | NA | NSR | B/L LZ HAZINESS | 24 | 45 | 20 | 22 | 10/13 |
| 136 | 872358 | 1.70 | 71 | 133 | 3.76 | 106 | 64 | NA | 1.12 | 0.60 | 12 | 30 | 86 | 6.50 | 2.91 | 1810 | NA | NSR | B/L LZ HAZINESS | 24 | 45 | 20 | 22 | 10/12 |

| Sr. No. | CR/MRD No. | | | | | | | | Treatment Given | | | | | | | | Outcome | | Type of heart failure | Discharged/ Death | Follow up | | | | Readmission within 3 months |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2-D ECHO LVID (D/S) | 2-D ECHO LVPW (D/S) | 2-D ECHO EF (%) | 2-D ECHO FS | 2-D ECHO Associated MR | 2-D ECHO E/A ratio | Ultrasound Abdomen (where available) | | | | | | | | | NYHA Grade | | | | NYHA Grade | | Survival Status | | |
| | | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | At Adm | Antiplatelets | Statin | Diuretics | ACE-/ARB | CCB | Vasodilator | Mineralcorotocoid Antagonist | Beta Blockers | DOA | DOD | | | At 1 month | At 3 months | At 1 month | At 3 months | |
| 74 | 730032 | 52/44 | 9/10 | 32 | 15 | MILD | 99/37 | NA | Y | Y | Y | N | N | N | N | N | 4 | 1 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | Y |
| 75 | 176524 | 61/50 | 12/14 | 30 | 15 | MODERATE | 96/42 | NA | Y | Y | Y | N | N | N | N | N | 4 | 2 | CAD | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 76 | 277217 | 58/44 | 06/08 | 47 | 24 | MODERATE | 145/120 | NA | Y | Y | Y | N | N | Y | N | N | 2 | 1 | CAD | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 77 | 733905 | 73/65 | 10/11 | 25 | 12 | MODERATE | 93/41 | NA | Y | Y | Y | N | N | Y | N | N | 3 | 2 | CAD | DISHCARGED | 3 | 2 | ALIVE | ALIVE | N |
| 78 | 734345 | 46/26 | 9/10 | 60 | 30 | MILD | 94/45 | HEPATOMEGALY, FATTY LIVER | Y | Y | Y | N | N | Y | N | N | 3 | 1 | HFnEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 79 | 39225 | 39/27 | 14/17 | 60 | 30 | MODERATE | 150/149 | RENAL PARENCHYMAL CHANGES | N | N | Y | N | N | N | Y | N | 1 | 1 | HFnEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 80 | 380805 | 43/37 | 6/7 | 26 | 14 | MODERATE | 133/149 | NA | Y | Y | Y | N | Y | Y | N | N | 3 | 2 | HFrEF | DISHCARGED | 2 | 3 | ALIVE | ALIVE | N |
| 81 | 739064 | 50/38 | 11/12 | 48 | 23 | MODERATE | **112/138** | NA | Y | Y | Y | N | N | N | Y | Y | 1 | 1 | HFmrEF | DISHCARGED | 2 | 1 | ALIVE | ALIVE | N |
| 82 | 380805 | 43/37 | 6/7 | 38 | 19 | NO | NA | NORMAL | Y | Y | Y | N | N | Y | N | Y | 3 | 2 | CAD | DISHCARGED | 3 | 2 | ALIVE | ALIVE | N |
| 83 | 741314 | 42/29 | 10/13 | 60 | 30 | NO | NA | NA | Y | Y | Y | N | Y | N | N | N | 3 | 2 | HFnEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 84 | 69779 | 43/28 | 9/13 | 60 | 30 | NO | 155/123 | NA | Y | Y | Y | N | N | N | N | N | 2 | 1 | HFnEF | DISHCARGED | 1 | 2 | ALIVE | ALIVE | N |
| 85 | 500731 | 53/42 | 9/11 | 35 | 15 | MILD | NA | RENAL PARENCHYMAL CHANGES | Y | Y | Y | Y | N | Y | N | N | 3 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 86 | 742237 | 59/49 | 8/11 | 32 | NA | MODERATE | 114/48 | NA | Y | Y | Y | N | N | N | N | N | 3 | 2 | HFrEF | DISCHARGED | 3 | NA | ALIVE | DEAD | Y |
| 87 | 743429 | 60/54 | 9/11 | 20 | NA | MILD | 48/66 | NA | Y | Y | Y | N | N | N | N | N | 3 | 2 | HFrEF | DEATH | NA | NA | DEAD | DEAD | N |
| 88 | 735987 | 57/46 | 9/10 | 42 | NA | NO | 109/132 | NA | Y | Y | Y | N | N | N | N | N | 2 | 2 | CAD | DISHCARGED | 2 | 1 | ALIVE | ALIVE | N |
| 89 | 745943 | 61/55 | 5/7 | 28 | 14 | MILD | NA | B/L PLEURAL EFFUSION | Y | Y | Y | N | N | N | Y | Y | 4 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 90 | 750558 | 38/28 | 12/14 | 60 | 30 | NO | NA | B/L PLEURAL EFFUSION | Y | Y | Y | N | Y | N | Y | N | 4 | 2 | HFnEF | DISHCARGED | 2 | 1 | ALIVE | ALIVE | N |
| 91 | 752143 | 72/62 | 7/9 | 22 | 12 | MODERATE | 141/81 | RENAL PARENCHYMAL CHANGES | Y | Y | Y | Y | N | N | N | N | 4 | 2 | HFrEF | DISHCARGED | 1 | 2 | ALIVE | ALIVE | N |
| 92 | 749801 | 49/32 | 14/15 | 60 | 30 | NO | NA | RIGHT PLEURAL EFFUSION | Y | Y | Y | N | N | Y | N | N | 2 | 1 | HFnEF | DISHCARGED | 1 | 2 | ALIVE | ALIVE | Y |
| 93 | 643615 | 50/35 | 10/11 | 60 | 28 | NO | NA | NA | Y | Y | Y | N | N | Y | N | N | 4 | 2 | HFnEF | DISCHARGED | 2 | 2 | ALIVE | ALIVE | Y |
| 94 | 755270 | 53/42 | 16/18 | 30 | 15 | MODERATE | NA | NA | Y | Y | Y | Y | Y | N | N | N | 4 | 2 | HFrEF | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 95 | 676539 | 49/41 | 11/12 | 32 | NA | MODERATE | NA | NA | Y | Y | Y | N | N | N | N | N | 3 | 2 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 96 | 756020 | 50/40 | 10/11 | 34 | 15 | NO | NA | B/L PLEURAL EFFUSION | Y | Y | Y | N | N | N | Y | N | 4 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 97 | 759692 | 52/45 | 9/10 | 18 | 9 | MILD | NA | NORMAL | Y | Y | Y | Y | N | N | N | N | 4 | 2 | HFrEF | DISHCARGED | 3 | 3 | ALIVE | ALIVE | N |
| 98 | 759773 | 48/28 | 12/14 | 60 | 30 | MILD | NA | NA | Y | Y | Y | Y | N | N | N | N | 2 | 1 | HFnEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 99 | 249388 | 43/37 | 6/7 | 40 | 20 | NO | NA | NA | Y | Y | Y | N | N | N | N | Y | 3 | 2 | CAD | DISHCARGED | 2 | 1 | ALIVE | ALIVE | Y |
| 100 | 764271 | 53/48 | 10/12 | 28 | 12 | NO | 120/118 | NA | Y | Y | Y | Y | N | Y | Y | Y | 3 | 2 | CAD | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 101 | 709372 | 62/55 | 6/7 | 16 | 8 | MODERATE | NA | NA | Y | Y | Y | Y | N | N | N | Y | 4 | 3 | CAD | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 102 | 712258 | 69/57 | 9/10 | 25 | 13 | NO | NA | NA | Y | Y | Y | Y | N | N | Y | Y | 4 | 1 | CAD | DISHCARGED | 2 | 1 | ALIVE | ALIVE | N |
| 103 | 252242 | 63/55 | 8/10 | 26 | 13 | MODERATE | NA | NA | Y | Y | Y | N | N | N | N | Y | 3 | 2 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | Y |
| 104 | 771882 | 49/39 | 9/10 | 45 | 23 | MILD | 104/120 | HEPATOMEGALY, FATTY LIVER | N | N | Y | N | Y | N | N | N | 3 | NA | HFmrEF | DEATH | N | NA | DEAD | DEAD | N |
| 105 | 588257 | 41/29 | 10/13 | 45 | 23 | MILD | 53/76 | NA | Y | Y | Y | Y | N | N | N | N | 2 | 1 | CAD | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 106 | 772865 | 70/65 | 9/10 | 15 | NA | MILD | NA | HEPATOMEGALY, FATTY LIVER | Y | Y | Y | N | N | N | Y | N | 3 | 2 | HFrEF | DISHCARGED | 2 | NA | ALIVE | DEAD | Y |
| 107 | 397063 | 53/45 | 5/6 | 30 | 15 | MILD | NA | NA | Y | Y | Y | N | N | Y | N | N | 4 | 1 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | Y |
| 108 | 776546 | 53/45 | 5/6 | 30 | 15 | MILD | NA | NA | Y | Y | Y | Y | N | N | N | N | 2 | 2 | CAD | DAMA | NA | NA | ALIVE | ALIVE | N |
| 109 | 778417 | 65/56 | 12/13 | 24 | 12 | MODERATE | NA | NA | Y | Y | Y | y | N | N | Y | N | 4 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 110 | 778540 | 32/23 | 12/11 | 35 | 17 | MILD | NA | ASCITES | Y | Y | Y | N | N | N | N | Y | 3 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 111 | 778439 | 61/55 | 6/7 | 28 | 14 | MILD | NA | NA | Y | Y | Y | Y | N | N | N | N | 3 | 2 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 112 | 319347 | 41/30 | 12/14 | 60 | 30 | MILD | 31/73 | NA | Y | Y | Y | N | N | Y | N | N | 3 | 1 | CAD | DISHCARGED | NA | NA | DEAD | DEAD | Y |
| 113 | 182472 | 50/36 | 10/12 | 60 | 30 | NO | NA | NA | Y | Y | Y | Y | N | N | N | N | 2 | 1 | HFnEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | Y |
| 114 | 729350 | 58/49 | 10/11 | 28 | 14 | MODERATE | NA | NA | Y | Y | Y | N | N | N | N | N | 2 | 1 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 115 | 206131 | 53/42 | 16/18 | 30 | 15 | NO | NA | NA | Y | Y | N | N | N | N | N | N | 4 | NA | CAD | DEATH | NA | NA | DEAD | DEAD | Y |
| 116 | 788345 | 66/57 | 13/14 | 28 | 14 | MILD | NA | NA | Y | Y | Y | N | N | N | Y | N | 2 | 1 | HFrEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 117 | 789268 | 42/36 | 12/13 | 32 | 16 | MILD | 63/68 | B/L PLEURAL EFFUSION | Y | Y | Y | N | N | Y | N | N | 4 | 3 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 118 | 509042 | 77/66 | 10/11 | 18 | 9 | MODERATE | 82/84 | NA | Y | Y | Y | Y | N | N | N | N | 4 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | Y |
| 119 | 790213 | 42/37 | 9/12 | 30 | 15 | NO | NA | HEPATOMEGALY, FATTY LIVER | N | N | Y | N | N | N | N | N | 3 | 1 | HFrEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 120 | 40899 | 95/82 | 14/13 | 15 | 8 | MODERATE | NA | NA | N | N | Y | Y | N | N | N | N | 4 | 2 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 121 | 509043 | 77/66 | 10/11 | 18 | 9 | MODERATE | NA | NA | Y | Y | Y | Y | N | N | Y | N | 4 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 122 | 401918 | 69/56 | 8/9 | 25 | 13 | MODERATE | 109/86 | NA | Y | Y | Y | Y | N | N | Y | Y | 4 | 2 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 123 | 217969 | 54/45 | 10/11 | 34 | 17 | MODERATE | 109/104 | RIGHT PLEURAL EFFUSION | Y | Y | Y | N | N | N | N | N | 4 | 2 | CAD | DISHCARGED | 3 | 3 | ALIVE | ALIVE | Y |
| 124 | 833152 | 67/60 | 10/11 | 20 | 11 | MODERATE | NA | NA | Y | Y | Y | N | N | N | N | Y | 3 | 1 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 125 | 164770 | 45/31 | 13/15 | 60 | 30 | NO | NA | RIGHT PLEURAL EFFUSION | Y | Y | Y | N | N | N | N | N | 3 | 2 | HFnEF | DISCHARGED | 2 | 1 | ALIVE | ALIVE | Y |
| 126 | 733061 | 65/58 | 9/10 | 20 | 10 | NO | NA | NORMAL | Y | Y | N | N | N | N | N | N | 4 | NA | CAD | DEATH | NA | NA | DEAD | DEAD | N |
| 127 | 176249 | 57/45 | 9/11 | 40 | 20 | NO | NA | HEPATOMEGALY, FATTY LIVER | Y | Y | Y | Y | N | Y | N | N | 3 | 2 | CAD | DISHCARGED | 2 | 4 | ALIVE | ALIVE | Y |
| 128 | 874614 | 39/25 | 12/15 | 60 | 30 | **NO** | 65/90 | NA | Y | Y | Y | Y | N | N | N | N | 2 | 2 | HFnEF | DISCHARGED | 2 | 1 | ALIVE | ALIVE | Y |
| 129 | 200876 | 49/38 | 10/12 | 42 | 21 | MILD | NA | B/L PLEURAL EFFUSION | Y | Y | Y | N | N | N | Y | N | 4 | 2 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 130 | 740889 | 68/56 | 8/9 | 25 | 13 | SEVERE | NA | NA | Y | Y | Y | N | N | N | N | Y | 3 | 2 | HFrEF | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 131 | 806420 | 25/23 | 13/14 | 60 | 30 | NO | NA | NA | Y | Y | Y | Y | N | N | N | N | 2 | 1 | HFnEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 132 | 713178 | 65/56 | 12/13 | 24 | 12 | M0DERATE | NA | HEPATOMEGALY, FATTY LIVER | Y | Y | Y | N | N | N | Y | N | 4 | 2 | CAD | DISHCARGED | 2 | 3 | ALIVE | ALIVE | Y |
| 133 | 809725 | 48/41 | 9/10 | 28 | 14 | MODERATE | NA | NA | Y | Y | Y | N | N | N | N | N | 3 | 1 | CAD | DISHCARGED | 2 | 2 | ALIVE | ALIVE | N |
| 134 | 772330 | 49/42 | 10/11 | 28 | 14 | MILD | 84/61 | NA | Y | Y | Y | N | N | N | N | N | 3 | 1 | CAD | DISHCARGED | 1 | 2 | ALIVE | ALIVE | N |
| 135 | 811507 | 41/30 | 10/11 | 60 | 30 | NO | NA | NA | N | Y | Y | Y | Y | N | N | N | 2 | 1 | CAD | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |
| 136 | 872358 | 42/29 | 10/12 | 60 | 30 | NO | NA | NA | N | Y | Y | N | Y | N | N | N | 2 | 1 | HFnEF | DISHCARGED | 1 | 1 | ALIVE | ALIVE | N |

Baba Farid University
of Health Sciences
Sadiq Road
Faridkot-151 203 (Pb). INDIA.
Phone : 01639-256232,256236
Tele/Fax : 01639-256235
Email – Examination@bfuhs.ac.in

19

No. BFUHS/2K19p-TH/ 1226

Date 29/5/19

The Principal,
**DMC, Ludhiana.**

**Subject:** **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 29.05.2019 has approved the plan of thesis of **Twinkle**, a student of your college for **MD General Medicine** along with the names of Supervisor/Co-Supervisor as under:-

**Topic Plan of Thesis**

**A comparative study of patients of acute heart failure with and without type-2 diabetes mellitus**

Supervisor
Dr. Vipin Kumar
Asst. Prof.,
Dept. of Medicine,
DMCH, Ludhiana.

Co-Supervisor
Dr. Parminder Singh
Prof. & Head,
Dept. of Endocrinology,
DMCH, Ludhiana.

Dr. Abhishek Goyal
Asst. Prof.,
Dept. of Cardiology,
DMCH, Ludhiana.

The student has to submit the four copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination, He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,( if any).

Dr. S P Singh MS(Oph)
Controller of Examinations

*Note :*

1. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
2. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

Scanned by CamScanner

# A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTOR OF MEDICINE

IN

MEDICINE

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

SEPTEMBER, 2018

DR. TWINKLE

DEPARTMENT OF MEDICINE
DAYANAND MEDICAL COLLEGE & HOSPITAL
LUDHIANA

# ABSTRACT OF PLAN OF THESIS

| | |
|---|---|
| Title | A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS |
| For the degree of | M.D. (Medicine) |
| Name of the candidate | Dr. Twinkle |
| Supervisor | Dr. Vipin Kumar, Assistant professor, Department of Medicine, DMCH, Ludhiana |
| Co-supervisor(s) | Dr. Parminder Singh, Professor and Head, Department of Endocrinology, DMCH, Ludhiana<br><br>Dr. Abhishek Goyal, Assistant Professor , Department of Cardiology, DMCH, Ludhiana. |
| Institution | Dayanand Medical College and Hospital, Ludhiana |
| University | Baba Farid University of Health Sciences, Faridkot |

**Introduction**: Heart Failure is a common finding in patients with type 2 Diabetes Mellitus, just as Diabetes in patients with heart failure. Today, at least a third of all patients admitted to hospital with heart failure have diabetes, And type 2 diabetes patients have twice the risk of incident heart failure than patients without diabetes. Diabetes mellitus type 2 is a chronic disease with increasing prevalence. About 194 million people worldwide in age group of 20-79 years were estimated to have diabetes in 2003.the number of diabetic patients will rise to a projected 592 million by 2035, which is expected to result in a substantial burden due to various acute and chronic complications of diabetes. Since the report of Framingham heart study diabetes has been aware to increase the risk of heart failure but most of the previous studies were based on data from Health Maintainence Organisation (HMO), related only to acute Myocardial Infarction or specific to elderly population. But a number of prospective studies have reported a linear relationship between glycemic control and heart failure.

**Aim of Study**: A comparative study of patients of acute heart failure with and without type 2 diabetes mellitus.

**Materials & Methods**: This will be a prospective study conducted on patients of age >40 years who present to Dayanand Medical College and Hospital with the signs and symptoms of acute heart failure.

**Clinical Significance**: Diabetes commonly coexists with heart failure. Diabetes is a risk factor for new onset heart failure, suggesting that glycemic control may influence development of new onset heart failure. So, this study is being conducted to compare the clinical profile and outcome of heart failure in patients with and without diabetes mellitus.

**Keywords**: Acute Heart Failure, Type 2 diabetes mellitus.

| (Signature) Candidate | (Signature) Co-supervisor | (Signature) Co-supervisor | (Signature) Supervisor | (Signature) Principal |
|---|---|---|---|---|

# CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis entitled "**A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS**" exist in the Department of Medicine, Dayanand Medical College & Hospital, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate herself under our supervision and guidance.

**Supervisor**

**Dr. Vipin Kumar**
Assistant Professor
Department of Medicine
DMCH, Ludhiana

**Co-Supervisor(s)**

**Dr. Parminder Singh**
Professor & Head
Department of Endocrinology
DMCH, Ludhiana

**Dr. Abhishek Goyal**
Assistant Professor
Department of Cardiology
DMCH, Ludhiana

**Dr. Dinesh Gupta**
Professor & Head
Department of Medicine
DMCH, Ludhiana

Place : Ludhiana

Date : 12/12/18

# APPROVAL PROFORMA
# BY
# RESEARCH & ETHICAL COMMITTEE
# DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

| | |
|---|---|
| **Name of candidate** | Dr. Twinkle |
| **Department** | Medicine |
| **Topic of Thesis** | A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS |
| **Likely date of appearing in PG examination** | MAY-JUNE 2021 |
| **Date of enrollment** | MAY 9, 2018 |
| **Name of Head of Department** | Dr. Dinesh Gupta |
| **1) Supervisor**<br>**2) Co-Supervisor(s)** | Dr. Vipin Kumar<br>Dr. Parminder Singh<br>Dr. Abhishek Goyal |
| **Signature of Members of Research Committee with Stamp** | **Signature of Members of Ethics Committee with Stamp** |
| 1. HOD Pharmacology | 1. HOD Physiology |
| 2. HOD Surgery | 2. HOD Pathology |
| 3. HOD Pathology | 3. HOD Pharmacology |
| 4. HOD Medicine | 4. HOD SPM |
| 5. Dean Academics | 5. HOD Medicine |
| 6. Vice Principal | 6. HOD Surgery |
| | 7. HOD Obst. & Gynae. |
| | 8. Legal Expert |
| | 9. Secretary, IEC |
| | 10. Dean Academics |
| | 11. Vice Principal |
| | 12. Principal |

**Approved: Yes / No**

**Chairperson**
**Research Committee**

Chairperson
Research Committee

**Approved: Yes / No**

**Chairperson**
**Ethics Committee**

Chairperson
Ethics Committee

# BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

## PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

| | | |
|---|---|---|
| 1 | NAME OF THE CANDIDATE AND ADDRESS | Dr. TWINKLE<br>Ward no.10, Zora basti, Patran, Distt. Patiala |
| 2 | NAME OF THE INSTITUTE | Dayanand Medical College and Hospital, Ludhiana |
| 3 | COURSE OF STUDY AND SUBJECT | MD Medicine |
| 4 | DATE OF ADMISSION OF COURSE | May 9, 2018 |
| 5 | TITLE OF THE TOPIC | A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS |

## 6. BRIEF RESUME OF THE INTENDED WORK

### 6.1 NEED FOR THE STUDY

Throughout the world, Heart failure has been singled out as an emerging epidemic throughout the world especially in the elderly individuals. This is attributed to increased longevity of life, better survival from myocardial infarctions with subsequent damaged hearts and increasing incidence of diabetes, obesity and hypertension. Over the past decade, the rate of hospitalization for heart failure has increased by 159% in the western countries. Rapidly and accurately determining the etiology of acute dyspnea in patients presenting in emergency is extremely important.

Heart failure is diagnosed in patients who present with non- specific symptoms (e.g. breathlessness, ankle swelling) and signs(e.g. basal lung crackles). To confirm clinically suspected heart failure, we rely on ejection fraction of left ventricle. Technically, ECHO is useful to evaluate systolic function in patients suspected to have heart failure. But, upto 50% of patients with heart failure may have preserved ejection fraction (i.e. Diastolic heart failure). The best way to diagnose these patients is unclear. BNP increases when cardiac myocytes are strained. Therefore, BNP is an effective method for detecting heart failure with or without systolic dysfunction.

According to ESC guidelines 2016, Heart failure comprises a wide range of patients, from those with normal LVEF (typically considered as ≥50%; HF with preserved EF (HFpEF) to those with reduced LVEF ( typically considered as <40% ; HF with reduced EF (HFrEF). Patients with an LVEF in the range of 40-49% represent a 'grey area', which we now define as HFmrEF.[1]

Type 2 diabetes mellitus is a complex disease that leads to continuous medical care with comprehensive, multifactorial strategies for reducing

cardiovascular risk. India is the world capital of known diabetes. There are currently more than 30 million people living with diabetes in India. The increase in diabetes is mainly attributed to modernization or westernization of the world societies.[2]

Diabetes mellitus type 2 is a chronic disease with increasing prevalence. About 194 million people worldwide in age group of 20-79 years were estimated to have diabetes in 2003.[3] The number of diabetic patients will rise to a projected 592 million by 2035, which is expected to result in a substantial burden due to various acute and chronic complications of diabetes.[4]

The coexistence of heart failure and type 2 diabetes mellitus is common and has a strong impact on clinical management and prognosis. Type 2 diabetes is associated with worse clinical status and increased all- cause and cardiovascular mortality in both patients with HF with reduced (HFrEF) and preserved ejection fraction (HFpEF), compared to HF without type 2 diabetes. We therefore conducted a study to evaluate the clinical profile and type of heart failure in patients with type 2 diabetes versus non diabetics. We will also study the outcome of such patients by following up the patients at 1 month and 3 months.

## 6.2 REVIEW OF LITERATURE

Epidemiologic and clinical data from the last two decades have led to the recognition that, in addition to myocardial infarction and other atherosclerosis- related cardiovascular events, heart failure is a major contributor to cardiovascular mortality and morbidity in patients with diabetes. In certain patients with diabetes, the observation that myocardial dysfunction is present in the absence of coronary artery disease, valvular disease, and the sequelae of associated cardiovascular risk factors has led to the use of the poorly understood term "Diabetic cardiomyopathy". This term was first used in 1972 by Rubler et al [5], describing myocardial dysfunction in patients with diabetes in absence of coronary artery disease, hypertrophy, or valvular heart disease. There is ongoing discussion whether diabetic cardiomyopathy exists as specific entity or not, as considered by Ernande and Derumeaux in their review from 2012, "diabetic cardiomyopathy: myth or reality?"[6]

This ongoing discussion reflects the fact that little is known about the pathophysiology and the underlying molecular mechanism of heart failure in patients with diabetes. Only recently have clinical and epidemiological data demonstrated the incidence, prevalence and prognosis of heart failure in patients with type 2 diabetes. To date, heart failure has been described as heart failure with preserved ejection fraction (HFpEF) and heart failure with reduced ejection fraction (HFrEF), according to left ventricular function. To dichotomize heart failure into these 2 entities has certain limitations and probably does not cover an intermediate stage that most recent guidelines of the European Society of Cardiology (ESC) termed heart failure with mid

range ejection fraction(HFmrEF) ; Ejection fraction- 40-49%.[1]

The prevalence of heart failure is approximately 1-2% of the adult population in developed countries, rising to ≥ 10% among people >70 years of age. Among people with >65 years of age presenting to primary care with breathlessness on exertion , one in six will have unrecognized heart failure (mainly HFpEF). The lifetime risk of heart failure at age of 55 years is 33% for men and 28% for women. The proportion of patients with HFpEF ranges from 22 to 73%, depending on the definition applied, the clinical setting (primary care, hospital clinic, hospital admission), age and sex of the studied population, previous myocardial infarction.

TYPE 2 DIABETES is a complex disease that leads to continuous medical care with comprehensive, multifactorial strategies for reducing cardiovascular risk. Patients with type 2 diabetes have risks of death and cardiovascular events that are 2 to 4 times as great as the risk in the general population. Diabetes is a major epidemic in the world. About 194 million people worldwide or 5.1% in the age group of 20-79 were estimated to have diabetes in 2003. This estimate expected to increase to some 33 million or 6.3% of the adult population by 2025.[3] which is expected to result in a substantial disease burden due to various acute and chronic complications of diabetes. The coexistence of heart failure and type 2 diabetes mellitus is common and has a strong impact on clinical management and prognosis. Type 2 diabetes is associated with worse clinical status and increased all- cause and cardiovascular mortality in patients with reduced (HFrEF) and preserved ejection fraction(HFpEF), compared to HF without Type 2 diabetes.[7] Conversely, HFrEF is an

independent predictor of fatal and non-fatal clinical outcomes in patients with type 2 diabetes.[8,9] The major causes of heart failure in diabetes include coronary artery disease and hypertension, but also, a possible direct detrimental effect of diabetes on myocardium.[10] In the Reykjavik study in the general population, the prevalence of heart failure in people with diabetes was 12%.[11] In this study, heart failure was more common in patients with type 2 diabetes aged >70 years (i.e, 16% and 22% of men and women respectively). In the Kaiser Permanente population, patients with type 2 diabetes aged <75 years had an approximately three fold higher prevalence of heart failure compared to those without diabetes.[12] In those aged 75-84 years, type 2 diabetes was associated with a doubling of risk for heart failure.

Type 2 diabetes is a common finding in patients with heart failure, just as heart failure is a common finding in patients with type 2 diabetes. In clinical trials of type 2 diabetes, the prevalence of heart failure at baseline has varied b/w approximately 10% and 30%.[13-15] Various epidemiologic data have shown that prediabetes is associated with a high risk of heart failure. It has been suggested that at least 70% of all patients with heart failure may now have prediabetes or diabetes mellitus. Today atleast a third of all patients admitted to hospital with heart failure may have diabetes. Equally, patients with type 2 diabetes have over twice the risk of heart failure than people without diabetes. The admission rate of patients with heart failure is higher in those with diabetes, as diabetes and its associated comorbidity contributes to the progression, complexity ,and severity of heart failure, making their cardiovascular homeostasis all the more precarious. For

example, in the PARADIGM-HF studies, prediabetes was associated with increased risk for hospitalization for heart failure. But with diabetes, that risk increased further, to almost twice that observed in non-diabetic patients.[10]

Yu-Yang Chen et al conducted study on total of 624 patients from October 2000 to April 2014. All patients were stratified by three groups according to their fasting plasma glucose levels {i.e. diabetes mellitus (DM), impaired fasting glucose (IFG), and non-DM}. A total of 587 patients were included in final analysis. The all-cause mortality rates of patients with DM, IFG and non-DM were 55.5%, 40.3% and 39.2% with significant difference (p=0.001). Moreover compared with those with IFG (34.3%) and non-DM (32.6%), patients with DM had significantly higher rate of cardiovascular mortality (45.1%).[16]

A large community based cohort study of 6814 subjects without coronary vascular disease at baseline was followed for 4 years, and the incidence of heart failure, depending on the presence of metabolic syndrome, was analyzed. The study showed that features of metabolic syndrome are associated with an increased risk of heart failure, with two-third of patients developing HFrEF.[17]

The most meaningful clinical endpoints for prognosis and outcome in patients with heart failure are mortality and hospitalization for heart failure. The risk for these endpoints is markedly increased in subjects with diabetes compared with the without diabetes. The Danish Investigations of Arrhythmia and Mortality on Dofetilide (DIAMOND) study assessed the influence of diabetes on risk of death in 5491 patients hospitalized with congestive heart failure when followed up for 5 to 8 years. In this study

population 16% of patients had diabetes at baseline, and approximately 50% had an ejection fraction <35%, suggesting that both HFrEF and HFpEF were present in this subpopulation.[18]

Recently, a population-based study of 1.9 million patients with type 2 diabetes without overt CV disease, followed for 5.5 years, demonstrated that incident HF was observed more frequently (14.1%) than vascular events, including myocardial infarction(MI) or stroke.[19] Type 2 diabetes is an independent risk factor for the development of heart failure.[12] In a retrospective cohort followed for up to 72 months, patients with type 2 diabetes were more likely to develop heart failure than patients without type 2 diabetes (incidence rate 30.9 vs 12.4/ 1000 person- years, rate ratio 2.5).[20] In elderly patients with type 2 diabetes, the incidence of heart failure was two- fold higher compared to patients without type 2 diabetes (121 vs 62 cases/ 1000 patient-years).[21]

## 6.3 AIMS AND OBJECTIVES OF THE STUDY

1. To compare the clinical profile and outcome of patients of acute heart failure with and without type 2 diabetes mellitus admitted in tertiary care centre.

## 7. MATERIALS AND METHODS

This will be a prospective study conducted on patients of acute heart failure with who present to Dayanand Medical College and Hospital, Ludhiana from 1st Jan 2019 to 30th Sept, 2019 and patients will be followed up at 1month and 3 months.

### 7.1 Source of Data

The study will include indoor patients presenting to department of Medicine and other allied specialties of Medicine, Dayanand Medical College and Hospital, Ludhiana, and are found to have acute heart failure.

## 7.2 METHOD OF COLLECTION OF DATA

### INCLUSION CRITERIA

- Age >40 years
- Patients admitted with symptoms and signs of acute heart failure.

### EXCLUSION CRITERIA

- Patients having chronic kidney disease( serum creatinine levels >2mg/dl)
- Patients with chronic liver disease and chronic obstructive airway disease.
- Pregnant females.
- Patients having myocarditis, restrictive or hypertrophic cardiomyopathy.
- Patients with valvular heart diseases.
- Patients having malignancy.
- BNP levels <100pg/ml

All the patients included in the study will be assessed as follow:

1. **Clinical assessment**

- Detailed history of presenting complaints will be taken.

- Relavant past history, personal history, drug history and family history will also be taken.
- Findings of general and systemic examination will be recorded.

**2. Laboratory investigations**

- The results of routine investigations like CBC, LFT, RFT, URINE ROUTINE, ECG, CHEST-X RAY, RBS will be recorded in all cases.
- The results of BNP levels, 2D ECHO, HbA1C, USG abdomen, TROP-T levels (optional) will be recorded.

**OUTCOME**

The outcome of the patient will be recorded as follow:

- Outcome of the patient at the end of the hospital stay- Discharged/ Death.

**FOLLOW- UP**

All patients will be followed up at an interval of 1month and 3 months either by patient visit or telephonically to see the dyspnea according to NYHA grade, readmission and survival status.

**STATISTICAL ANALYSIS**

Data will be described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. Comparison of quantitative variables between the study groups will be done using Student t-test and Mann Whitney U test for independent samples for parametric and non-parametric data respectively. For comparing categorical data, Chi square ($\chi 2$) test will be performed and exact test was used when the expected frequency is less than 5. A probability value (p value) less than 0.05 will be considered statistically significant. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows..

**7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.**

Trop-t levels will be done wherever indicated.

**7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?**

Attached along with

## LIST OF REFERENCES


1. ESC Clinical Practice Guidelines. Acute and Chronic Heart Failure. EHJ. 2016;37:2129-200.
2. Rawshani A, Rawshani A, Franzén S, Sattar N, Eliasson B, Svensson A-M, et al. Risk Factors, Mortality, and Cardiovascular Outcomes in Patients with Type 2 Diabetes. N Engl J Med. 2018;379:633-44.
3. International Diabetes Federation. Diabetes Atlas (2006) Available at: http://www.eaqtlas.idf.org/Prevalence/All_diabetes. Accessed 24 Sept 2018.
4. Chen HF, Ho CA, Li CY. Risk of heart failure in a population with type 2 diabetes versus a population without diabetes with and without coronary heart disease. Diabetes Obes Metab. 2018. [Epub ahead of print]
5. Rubler S, Dlugash J, Yuceoglu YZ, Kumral T, Branwood AW, Grishman A. New type of cardiomyopathy associated with diabetic glomerulosclerosis. Am J Cardiol. 1972;30:595-602.
6. Ernande L, Derumeaux G. Diabetic cardiomyopathy: myth or reality? Arch Cardiovasc Dis. 2012;105:218-225.
7. MacDonald MR, Petrie MC, Varyani F, Ostergren J, Michelson EL, Young JB, et al. CHARM Investigators. Impact of diabetes on outcomes in patients with low and preserved ejection fraction heart failure: an analysis of the Candesartan in Heart failure: Assessment of Reduction in Mortality and morbidity (CHARM) programme. Eur Heart J. 2008;29:1377-85.
8. MacDonald MR, Petrie MC, Hawkins NM, Petrie JR, Fisher M,

McKelvie R, et al. Diabetes, left ventricular systolic dysfunction, and chronic heart failure. Eur Heart J. 2008;29:1224-40.

9. Vaur L, Gueret P, Lievre M, Chabaud S, Passa P. DIABHYCAR Study Group. Development of congestive heart failure in type 2 diabetic patients with microalbuminuria or proteinuria: observations from the DIABHYCAR (type 2 DIABetes, Hypertension, Cardiovascular Events and Ramipril) study. Diabetes Care. 2003;26:855-60.
10. Seferovic PM, Paulus WJ. Clinical diabetic cardiomyopathy: a two-faced disease with restrictive and dilated phenotypes. Eur Heart J. 2015;36:1718-27.
11. Seferović PM, Petrie MC, Filippatos GS, Anker SD, Rosano G, Bauersachs J, et al. Type 2 diabetes mellitus and heart failure: a position statement from the Heart Failure Association of the European Society of Cardiology. Eur J Heart Fail. 2018;20:853-72.
12. Nichols GA, Hillier TA, Erbey JR, Brown JB. Congestive heart failure in type 2 diabetes: prevalence, incidence, and risk factors. Diabetes Care 2001;24:1614-9.
13. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). UK Prospective Diabetes Study (UKPDS) Group. Lancet. 1998;352:837-53.
14. Patel A, MacMahon S, Chalmers J, Neal B, Woodward M, Billot L, et al. ADVANCE Collaborative Group. Effects of a fixed combination of perindopril and indapamide on macrovascular and microvascular outcomes in patients with type 2 diabetes mellitus (the ADVANCE trial):

a randomised controlled trial. Lancet. 2007;370:829-40.

15. Patel A, MacMahon S, Chalmers J, Neal B, Billot L, Woodward M, et al. ADVANCE Collaborative Group. Intensive blood glucose control and vascular outcomes in patients with type 2 diabetes. N Engl J Med. 2008;358:2560-72.

16. Chen Y-Y, Chen Y, Liang S-M, Su Z-Z, Shu X-R, Zhang H-F, et al. Prognostic Impact of Fasting Plasma Glucose on Mortality and Re-Hospitalization in Patients with Acute Heart Failure. 2018;131:3032-40.

17. Bahrami H, Bluemke DA, Kronmal R. Novel metabolic risk factors for incident heart failure and their relationship with obesity: the MESA (Multi-Ethnic Study of Atherosclerosis) study. J Am Coll Cardiol. 2008;51:1775-83.

18. Gustafsson I, Brendorp B, Seibaek M. Influence of diabetes and diabetes-gender interaction on the risk of death in patients hospitalized with congestive heart failure. J Am Coll Cardiol. 2007;43:771-7.

19. Shah AD, Langenberg C, Rapsomaniki E, Denaxas S, Pujades-Rodriguez M, Gale CP, et al. Type 2 diabetes and incidence of cardiovascular diseases: a cohort study in 1.9 million people. Lancet Diabetes Endocrinol 2015;3:105–113.

20. Nichols GA, Gullion CM, Koro CE, Ephross SA, Brown JB. The incidence of congestive heart failure in type 2 diabetes: an update. Diabetes Care 2004;27:1879-4.

21. Aronow WS, Ahn C. Incidence of heart failure in 2,737 older persons with and without diabetes mellitus. Chest 1999;115:867-8.

# PROFORMA

**Sr. No. ___**

**Identification Data**-

- Name **:** Age **:** Sex **:**
- Address **:**
- Contact Number **:** CR No./MRD No.**:**
- DOA **:** DOD **:**

**Presenting complaints-**

| **Sr. No.** | **Complaint** | **Yes/No** | **Duration** |
|---|---|---|---|
| 1. | Breathlessness | | |
| 2. | Feet swelling | | |
| 3. | Palpitation | | |
| 4. | Fatigue | | |
| 5. | Syncope | | |
| 6. | Chest pain | | |
| 7. | Orthopnea | | |
| 8. | Paroxysmal nocturnal dyspnea | | |
| 9. | Any other systemic symptoms fever | | |
| 10. | Surgical stress | | |

**Signature of candidate** **Signature of supervisor**

**Past history-**

- Duration of diabetes mellitus type 2
- Known complications of diabetes
- Any other comorbidity
- Drug history :

| Name of the drug | Dose | Duration |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

| | Y/N | (If yes) type | Dose & Frequency |
|---|---|---|---|
| Insulin | | | |

**Personal history-**

- Addiction
    - Alcohol
    - I/V drug abuse
    - Smoking

**Family history-**

Family history of diabtes mellitus type 2

**General physical examination-**

- Pulse
- BP
- Respiratory rate
- SPO2
- Weight on Admission  Weight on Discharge
- Height  BMI
- Pallor

**Signature of candidate**  **Signature of supervisor**

- cyanosis
- clubbing
- edema
- JVP

**Systemic examination-**

- CVS-

| | | | |
|---|---|---|---|
| S1 | | S2 | |
| S3 | | S4 | |
| Any murmur | | | |

- Respiratory system- pulmonary rales
- Abdomen
    - Hepatomegaly
    - Splenomegaly
- CNS

**Provisional diagnosis-**

**Laboratory investigations-**

| **1. Hemogram** | **At admission** |
|---|---|
| Hemoglobin (gm/dl) | |
| TLC (x $10^3$/$mm^3$) | |
| N/L/M/E/B (%) | |
| Patelet Count (x $10^3$/$mm^3$) | |
| MCV (fl) | |
| MCH (pg) | |
| MCHC (%) | |
| ESR | |
| **2. RFT**<br>o Creatinine(mg/dl)<br>o Urea(mg/dl) | |

**Signature of candidate** **Signature of supervisor**

| | |
|---|---|
| o Sodium(mmol/l)<br>o Potassium(mmol/l)<br>o Chloride(mmol/l) | |
| **3. RBS(mg/dl)** | |
| **4. HbA1C** | |
| **5. LFT- (where applicable)**<br>o Total bilirubin(mg/dl)<br>o Direct bilirubin(mg/dl)<br>o AST(u/l)<br>o ALT(u/l)<br>o Alkaline phosphatase(u/l)<br>o Total protein(g/dl)<br>o Serum albumin(g/dl) | |
| **6. Urine Routine**<br>o Glucose<br>o Proteins<br>o Pus cells | |
| **7. Albumin Creatinine Ratio (where available)** | |
| **8. Urine C/S (where available)** | |
| **9. ECG** | |
| **10. BNP Levels** (pg/ml) | |
| **11. Trop-T Levels (where available)** | |
| **12. Chest X-RAY** | |
| **13. 2-D Echo**<br>• AORTIC ROOT<br>• LEFT ATRIUM<br>• RIGHT ATRIUM<br>• RVID (D)<br>• IVST (D/S)<br>• LVID (D/S)<br>• LVPW (D/S)<br>• Ejection fraction<br>• Fractional shortning<br>• End Diastolic Volume<br>• End Systolic Volume<br>• Associated MR | |

**Signature of candidate** **Signature of supervisor**

| | |
|---|---|
| • E/A ratio<br>• Diastolic Dysfunction | |
| **14. Ultrasound Abdomen (where available)** | |
| **15. Any other investigation done** | |

**Final diagnosis-**

**Treatment Given-**

1.
2.
3.
4.

**Outcome-**

**Signature of candidate** **Signature of supervisor**

| | DOA | DOD |
|---|---|---|
| NYHA grade | | |

A. Type of heart failure

B. Discharged/Death

**Follow up:** ( either patients visit or telephonic)

| | At 1 month | At 3 months |
|---|---|---|
| NYHA grade | | |
| Survival status | | |

**Signature of candidate** **Signature of supervisor**

## INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....

am willing to participate in the study **"A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

Name:

.....
Signature of the patient

**Signature of Candidate**

**Signature of Supervisor**

# मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____ निवासी _____ इस शोधकार्य "**A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS**" में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____
गवाह के हस्ताक्षर
नाम:

_____
रोगी के हस्ताक्षर/अंगूठे का निशान
नाम:

_____
अन्वेषक के हस्ताक्षर

_____
विद्यार्थी के हस्ताक्षर

# ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

**"A COMPARATIVE STUDY OF PATIENTS OF ACUTE HEART FAILURE WITH AND WITHOUT TYPE 2 DIABETES MELLITUS" ਤੇ ਚਲ ਰਹੀ ਖੋਜ** ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____

ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____

ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ